

SIZE OF INDIVIDUAL CONTACTS IN SLIDING FRICTION

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ABSTRACT

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Robert Blake Hayman

Submitted to the Department of Naval Architecture and Marine Engineering on May 21, 1956 in partial fulfillment of the requirements for the degree of Naval Engineer.

The object of this investigation was to determine the size of individual contacts in sliding friction by electronically measuring the duration of individual contacts. To accomplish this, a fine insulated tungsten wire and three heavier tungsten wires were imbedded in a glass probe which was ground so that the ends of the tungsten wires were exposed and formed a plane. A plane surface of 1045 steel was rotated beneath, and supported the probe which was held stationary by a pivoted rider arm. The duration of contacts between the fine insulated tungsten wire and the 1045 steel plate was measured electronically by a Sanborn recorder.

Calculations showed that the diameter of the average contact area occurring in sliding friction has an order of magnitude between 2×10^{-4} cm and 6×10^{-4} cm. Most of the contact areas have diameters much smaller than the diameter of the average contact area. The size distribution of the contact areas is such that the log of the number of contacts bears a linear relationship to the log of the average area for intervals of equal area.

Further investigation is required to determine the effect of contact deformation, relative velocity, surface finish and loading on the size of individual contacts in sliding friction.

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I. INTRODUCTION

Traditionally, the most satisfactory method for treating the subject of friction has been by the use of experimentally determined coefficients.

In expressions like the following one for total shear force

$$F_s = \tau A$$

neither τ nor A is known with precision. τ in fact, may vary considerably from one individual metallic contact to another. Thus A is really nothing more than a fictitious apparent area which may or may not be the same as the true area of contact. In handling most practical situations, it is not necessary to know these quantities exactly. However, if the mechanism of friction is to be more completely explained, it seems reasonable to suppose that a great deal more information concerning the size and distribution of the individual metallic contacts must be obtained.

Several methods for investigating the true area of contact between metallic surfaces have been devised.

Holz⁽¹⁾ estimated the true contact area by the measurement of electrical resistance. There are some rather severe restrictions which limit the validity of this approach, the unpredictable constriction effect upon the accuracy of the resistance measurements as a true in-

the following conditions are satisfied:

- (i) τ is a positive real number;
- (ii) τ is a positive real number;
- (iii) τ is a positive real number;
- (iv) τ is a positive real number;

and

$$\tau = \frac{1}{\lambda}$$

where τ is a positive real number and λ is a positive real number.

Let τ be a positive real number and λ be a positive real number.

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dication of the area in contact and the effect of oxide film to name but two. At best this gives only a rough indication of the true over all contact area. It is impossible to interpret the results in terms of the individual contacts.

Dyson and Hirst⁽⁴⁾ were able to draw several interesting conclusions from their work.

- a) Surface finish affects the distribution of the areas of contact.
- b) An increase in the loading increases the number of the groups of individual contacts but not their size. The size of the groups was estimated as about .2 mm for the pattern produced by pressing a silver steel plate against a silver coated piece of glass.
- c) Only a very small part of the metallic surface is in contact.

Here again, the method is not suitable for the determination of the individual contact areas. Also it gives a representation of the static picture only and the degree to which this can be taken as an indication of the dynamic picture is not known.

I-Ming Feng⁽⁸⁾ has studied the surface characteristics of metals and reports the dimensions of the scratches produced by diamond dust (0 to .5 micron) to be of the order of .01 to .05 microns. One micron = 10^{-4} cm.

location of the area in contact with the soil of the
film to make out the nature of the contact. It is in-
possible to interpret the results in terms of the in-

dividual contacts.

Cyber and (1974) were able to draw several inter-

esting conclusions from their work.

1) The results of the study are in line with the

theory of contact.

2) An increase in the loading increases the number

of the points of individual contacts and not

their size. The size of the groups was esti-

mated as about 1.5 for the different pressures

by repeated measurements of the contact area.

3) The contact area of the

4) Only a very small part of the available surface

is in contact.

5) The results show that the contact area is not

proportional to the loading and is not

proportional to the surface area of the

surface in contact with the soil.

6) The results are in line with the

theory of contact.

7) The results show that the contact area is not

proportional to the loading and is not

proportional to the surface area of the

E. Rabinowicz has proposed three interesting though somewhat indirect methods for estimating the average diameter of the individual contacts.

1. As part of his investigation of the static and kinetic coefficients of friction, Rabinowicz⁽²⁾ predicts an average contact diameter of about 7×10^{-4} cm for copper on steel.
2. Rabinowicz and Tabor⁽³⁾ estimate the average weight of transfer particles produced by the sliding motion between metallic surfaces to be about 10^{-5} grams. By assuming a simple hemispherical model, Rabinowicz⁽²⁾ computed an average diameter of about 17×10^{-4} cm for the individual contacts.
3. The most recent method used by Rabinowicz⁽⁶⁾ to predict the average diameter of the individual contact area comes as the result of the application of the auto-correlation analysis of sliding friction. The diameter obtained by this method is in the order of 10^{-3} cm.

The work of this present investigation represents an attempt to determine the magnitude of the average contact diameter in a much more direct manner. The time that a very fine tungsten wire imbedded in glass (Fig. 4) remains in contact with the surface imperfections as it moves relative to the face of a steel plate may be re-

1. The first step in the process of determining the value of a property is to identify the property and its location. This is done by obtaining a description of the property from the owner or a reliable source. The description should include the name of the property, its address, and any other identifying information. Once the property has been identified, the next step is to determine its location. This is done by obtaining a map or a set of directions that show the property's location relative to other landmarks or streets.

2. The second step in the process is to determine the value of the property. This is done by comparing the property to similar properties that have been sold recently. The value of the property is determined by the price that it was sold for. This is done by obtaining a list of similar properties and their sale prices. The value of the property is then determined by comparing its sale price to the sale prices of the other properties.

3. The third step in the process is to determine the value of the property. This is done by comparing the property to similar properties that have been sold recently. The value of the property is determined by the price that it was sold for. This is done by obtaining a list of similar properties and their sale prices. The value of the property is then determined by comparing its sale price to the sale prices of the other properties.

4. The fourth step in the process is to determine the value of the property. This is done by comparing the property to similar properties that have been sold recently. The value of the property is determined by the price that it was sold for. This is done by obtaining a list of similar properties and their sale prices. The value of the property is then determined by comparing its sale price to the sale prices of the other properties.

5. The fifth step in the process is to determine the value of the property. This is done by comparing the property to similar properties that have been sold recently. The value of the property is determined by the price that it was sold for. This is done by obtaining a list of similar properties and their sale prices. The value of the property is then determined by comparing its sale price to the sale prices of the other properties.

corded electronically by a Sanborn recorder. The problem which remains is essentially that of relating this measured contact duration to the individual area of contact.

At the time of the investigation, a very small number of persons

were known to have been in the vicinity of the place where

the crime was committed, and no one was known to have been

seen.

II. PROCEDURE

The apparatus used to determine the size of individual contact areas in sliding friction is shown in Figures 1, 2, and 3. Figure 1 is an overall view of the experimental set up. Figure 2 is a closer side view of the inverted drill press. Figure 3 is a close up showing in detail the mounting of the glass probe and steel plate.

A variable speed gear drive is used to turn the spindle of the inverted drill press. The flat plate specimen of 1045 steel is secured to a circular mounting block which is held in the drill chuck. The steel plate rotates beneath and supports the glass probe containing a fine tungsten contact wire. The glass probe is held stationary by a rider arm mounted on a platform which is clamped to the drill column. The rider arm is pivoted about a horizontal axis and balanced to permit the application of any desired total load. The steel plate is insulated from the mounting block and connected by wire to one side of a resistance bridge. The fine tungsten contact wire in the glass probe is connected to the other side of the bridge. The resistance bridge is connected to the Sanborn recorder so that contact between the steel plate and the tungsten contact wire can be recorded on tape.

The steel plate was rotated at speeds ranging

4-11. It is the policy of the Department of Defense to ensure that all personnel are properly trained and equipped to perform their duties. This includes the provision of adequate resources, the establishment of clear standards, and the implementation of effective training programs. The Department is committed to the continuous improvement of its personnel and the effectiveness of its operations. This commitment is reflected in the Department's ongoing efforts to identify and address training needs, to provide opportunities for professional development, and to ensure that all personnel are kept up-to-date on the latest information and technologies. The Department's training programs are designed to be comprehensive, relevant, and practical, and to provide personnel with the skills and knowledge necessary to perform their duties effectively. The Department is also committed to the safety and well-being of its personnel, and to the protection of its resources. This commitment is reflected in the Department's ongoing efforts to identify and address safety risks, to provide adequate resources for personnel, and to ensure that all personnel are kept up-to-date on the latest information and technologies. The Department's training programs are designed to be comprehensive, relevant, and practical, and to provide personnel with the skills and knowledge necessary to perform their duties effectively. The Department is also committed to the safety and well-being of its personnel, and to the protection of its resources. This commitment is reflected in the Department's ongoing efforts to identify and address safety risks, to provide adequate resources for personnel, and to ensure that all personnel are kept up-to-date on the latest information and technologies.

from .015 to .055 RPM. These low speeds were obtained by using a belt drive pulley system in conjunction with the variable speed gear drive. The lowest steady rotational speed which could be maintained by the variable speed gear drive with the pulley combination used was .015 RPM. The highest speed of rotation which still permitted distinguishing between the traces of individual contacts was about .055 RPM. Speed of rotation was measured by counting the circumferential distance which the rotating circular mounting block traveled with respect to a fixed pointer during one minute. Dividing this circumferential distance by the total circumference of the circular mounting block gave the speed of rotation in RPM.

A sketch of the glass probe is shown in Figure 4. The three relatively large diameter tungsten wires were undercut sufficiently to permit the fine tungsten contact wire to act as a high spot on that plane. Attaining the proper amount of undercutting to obtain intermittent contact between the tungsten contact wire and the steel plate was a trial process which took considerable time and patience. Two representative tape traces which show intermittent contact are given in Figure 5. For both traces the arrows beneath the traces point out the start of contact and the arrows above the traces point out the end of contact. The duration of a single contact is proportional to

the tape distance between the lines of action of any one lower arrow and the first upper arrow to the right of that lower arrow.

While measuring the size of individual contacts in sliding friction, it was decided to attempt to determine the effect of three variables:

1. Surface finish
2. Relative velocity (speed of rotation)
3. Load

To do this three sets of data were taken. Each set consisted of taking from five to seven tape recordings for a given surface finish, a given speed of rotation, and a range of loads (one tape for each load). For the first two sets of data the steel plate was finished with 2/0 emery paper. For the third set of data the steel plate was finished with #1 emery paper. In all cases the probe was undercut and finished with 2/0 emery paper. The first two sets of data were taken at the maximum difference in the speeds of rotation. The tabulated data for each of the 17 tape recordings is given in Appendix B.

In order to analyze the recorded data the following assumptions were made:

1. There is a single high spot on the probe contact wire.
2. The high spots on the steel plate and the high spot on the probe contact wire have spherical

the left distance between the lines of action of the two
lower lines and the line of action of the upper line of
the lower line.

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1. Lower line

2. Relative velocity (speed of rotation)

3. Load

To the left of the line of action of the lower line, the
line of action of the lower line is the line of action of
the lower line, and the line of action of the lower line
is the line of action of the lower line. For the line
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the distance between the lines of action of the two

1. The line of action of the lower line

2. The line of action of the lower line

3. The line of action of the lower line

4. The line of action of the lower line

surfaces with the same radius of curvature.

3. The effect of the limited size of the probe contact wire high spot is negligible.
4. The effect of the deformation of the two high spots during their mutual crossing is negligible.

With these assumptions it follows that during the crossing the maximum area in contact is circular with a diameter equal to one half of the tape contact distance times the crossing speed divided by the tape speed.

That is:

$$\text{Contact diameter} = \frac{(\text{tape distance}) (\text{crossing speed})}{2(\text{tape speed})} \quad (1)$$

Therefore, we have defined contact area as the maximum area in contact between two high spots during their mutual crossing.

The average of the contact diameters for each tape was computed by dividing the sum of the tape distance by the number of contacts and converting to contact diameter by equation (1).

The diameter of the average contact area for each tape was calculated using a statistical method to obtain the average tape distance squared and then, after taking the square root, converting to contact diameter by using equation (1).

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The statistical method can best be explained by referring to Table XXI. Twenty evenly spaced intervals of tape distance squared were used. In addition, the first interval was further broken down into ten evenly spaced intervals of distance squared. This additional breakdown was used to determine a more accurate mean value of tape distance squared for the first interval. The mean value of tape distance squared for all other intervals is defined as the average of the extreme tape distances squared for that interval. For all tapes the spacing of the intervals was such that the mean value of the tape distance squared for any one interval represented the same contact area for all tapes. Each of the few contact durations which did not fall within the twenty intervals was used as though it was the mean value of an interval containing that one contact duration.

The following table shows the results of the

analysis of the data for the various groups.

The results are given in the following table.

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The results are given in the following table.

III. RESULTS

The results of this investigation are given in Tables I and XX and in Figures 6, 7, and 8. The average diameter of the contact areas for each tape ranged from 1.16×10^{-4} cm to 3.77×10^{-4} cm. The diameter of the average area ranged from 1.93×10^{-4} cm to 5.90×10^{-4} cm.

Figure 6 shows the effect of relative velocity, loading, and surface finish on the average diameter of the contacts and on the diameter of the average contact area. The effect of these three variables is the same on both these diameters. Decreasing relative velocity decreases these diameters. Increasing loading with the 2/0 surface finish decreases these diameters. The coarser #1 surface finish tends to make the size of these diameters independent of loading.

The total number of contacts tabulated in Tables II through XIX is 3,169. Table XX shows that for these total contacts

2,793 have individual contact areas less than 292×10^{-8} cm²

2,524 have individual contact areas less than 14.6×10^{-8} cm²

1,558 have individual contact areas less than 1.46×10^{-8} cm²

This means that 80% of the contacts have diameters less than 4.3×10^{-4} cm, and about 50% of the contacts have diameters less than 1.4×10^{-4} cm. This size distribution of contact areas is given in Figures 7 and 8. These plots

show that a straight line relationship exists between the log of the number of contacts and the log of the average area for intervals of equal area.

and the other side of the hill. The first of these
 was the one of the hill to the right, and the
 other was the one to the left.

IV. DISCUSSION OF RESULTS

The accuracy of the diameter calculations depends primarily upon the relation between the measured contact duration and the contact area. Equation (1) is exact, and therefore the calculated diameters are correct, provided that the assumptions given in the procedure are exact. Therefore, each assumption will be examined to determine its validity.

Assumption 1: There is a single high spot on the probe contact wire. An attempt was made to insure the exactness of this assumption by making the exposed end of contact wire as small as possible. The exposed end of the probe contact wire was an ellipse with the following measurements:

$$\text{major axis} = 5.2 \times 10^{-4} \text{ cm}$$

$$\text{minor axis} = 4.3 \times 10^{-4} \text{ cm}$$

This shows that the mean diameter of the exposed end of the probe contact wire is of the same order of magnitude as the diameter of the average contact area. Therefore, it is improbable that there is more than one high spot on the probe contact wire. Hence we can say that assumption 1 is probably exact.

Assumption 2: The high spots on the steel plate and the high spot on the probe contact wire have spherical surfaces with the same radius of curvature. Most previous

investigators have used either hemispherical models or circular models for their investigation of contact area sizes. Therefore, it is felt that the assumption of spherical surfaces is a valid one provided that the plate surface is properly finished. To minimize the possibility of ridge shaped contact areas the plate surface was finished in two perpendicular directions. The effect of differences in the radii of curvature of the mutually crossing high spots upon the relation between contact duration and contact area will be negligible if the radii of curvature are large. According to previous investigations the angle of rise of the high spots is small. This means large radii of curvature of the spherical surfaces of the high spots. Consequently the effect of differences in radii of curvature on the relations between contact duration and contact area is negligible. Theoretically, while assumption 2 must be true for equation (1) to be exact, actually, the differences in radii of curvature have a negligible effect on the calculated values of contact diameters.

Assumption 3: The effect of the limited size of the probe contact wire high spot is negligible. The maximum area in contact during a crossing is actually limited to the area of the end of the probe contact wire. This area is about $17.7 \times 10^{-5} \text{cm}^2$. Approximately 20% of the total number of the contacts have contact areas which are greater. We are actually interested in measuring the contact area

THE FIRST PART OF THE BOOK IS A HISTORY OF THE

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AND THE SECOND PART IS A HISTORY OF THE

REIGN OF THE EMPEROR SHUNZHI (1644-1661)

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which would exist if the size of the probe contact wire high spot was not limited. The fact that the contact wire size is so small means that the larger 20% of diameters calculated using equation (1) would be smaller than the diameters that we are interested in calculating. The larger 20% of the contact durations add considerably to the size of the calculated average diameter of contact and the calculated diameter of the average area. Therefore, the limited size of the probe probably has a significant effect on these two calculated averages.

Assumption 4: The effect of the deformation of the two high spots during their mutual crossing is negligible. The hard tungsten probe contact wire will resist deformation. Hence the deformation will be limited to the 1045 steel plate. Limiting the deformation to one high spot will reduce the effect of deformation on contact durations. The effect of any deformation which does take place will be to increase the contact duration. This would cause the calculations to predict larger contact sizes than actually exist. Whether or not the effect of deformation on contact duration introduces significant error into the calculations is not known.

In order better to evaluate the significance of the calculated sizes of the contacts it is recommended that further investigation be made to determine the effect of the deformation of contacts on the contact durations. Nevertheless we can say that equation (1) gives an order of magni-

tude approximation of the contact diameter. Therefore, we conclude that:

1. The average of the diameters of individual contact areas has an order of magnitude between 1×10^{-4} cm and 4×10^{-4} cm.
2. The diameter of the average area of the individual contact areas has an order of magnitude between 2×10^{-4} cm and 6×10^{-4} cm.

It is obvious from the scatter of the data plotted in Figure 6 that the exact effects of the relative velocity, surface finish, and loading on the size of contact areas have not been determined. Therefore, it is recommended that further investigation be made to determine the effect of variables such as these on the size of contact areas. These plots do show general trends of the effects of relative velocity, surface finish, and loading on the size of contact areas. Therefore, we conclude that:

1. Increasing the relative velocity of the surfaces in contact probably increases the size of individual contact in sliding friction.
2. Increasing the loading probably decreases the size of individual contacts in sliding friction for surfaces finished with 2/0 emery paper.
3. Increasing the roughness of the surface finish probably tends to eliminate the effect of loading on the size of individual contact in sliding friction.

[illegible]

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... (faint text) ...

2000

Figures 7 and 8 show the size distribution of contact areas. The solid line in Figure 7 is a plot of the number of contacts in each of twenty even area intervals versus the mean area of each interval. In the intervals which contain large area contacts the ratio of the mean area of the interval to the average diameter of the interval is relatively close to unity. In the intervals which contain the small area contacts the ratio may be much greater than unity. Therefore, the solid line in Figure 7 is not a true representation of the size distribution of contact areas since the mean areas plotted for the intervals containing the small contact areas are considerably larger than the average area of the contacts in those intervals. The average area of the first of the twenty intervals was calculated by breaking that interval into ten evenly spaced area intervals and statistically computing the average area for the first interval. This results in the plotted point indicated by the arrow in Figure 7. Since the ratio of mean area to average contact area approaches unity as the intervals containing the larger contact areas are approached, it is postulated that the result of plotting the number of contacts in each interval versus the average contact area for each interval would be the dashed line in Figure 7. This postulation is corroborated by the plot of the size distribution of the contact areas in the first interval which is given in

Figure 8. The slope of the straight line plot in Figure 8 is equal to the slope of the dashed line plot in Figure 7. The mean area was used as the basis for this plot. However, since the area intervals are much smaller in this case, the ratio of mean area to average contact area for all intervals will be much closer to unity. Therefore, the plot given in Figure 8 is a good representation of the size distribution of contact areas.

We conclude that the distribution of contact areas is such that the log of the number of contacts bears a straight line relationship to the log of the average area for intervals of equal areas. Table XX shows the contact area distribution for all tapes. From Table XX we conclude that:

1. About 80% of the contact areas have diameters less than 4.3×10^{-5} cm.
2. About 50% of the contact areas have diameters less than 1.4×10^{-5} cm.

It is recommended that further statistical analysis of the tabulated data should be made for the purpose of explaining the size distribution of the contact areas.

The purpose of the present study is to determine the effect of the amount of time spent in the laboratory on the rate of learning. The results of the study are presented in Table I. The data show that the rate of learning is significantly higher when the amount of time spent in the laboratory is increased. This is true for all three groups of subjects. The results also show that the rate of learning is significantly higher when the amount of time spent in the laboratory is increased, regardless of the amount of time spent in the laboratory. This is true for all three groups of subjects. The results also show that the rate of learning is significantly higher when the amount of time spent in the laboratory is increased, regardless of the amount of time spent in the laboratory. This is true for all three groups of subjects.

The results of the study are presented in Table I. The data show that the rate of learning is significantly higher when the amount of time spent in the laboratory is increased. This is true for all three groups of subjects. The results also show that the rate of learning is significantly higher when the amount of time spent in the laboratory is increased, regardless of the amount of time spent in the laboratory. This is true for all three groups of subjects. The results also show that the rate of learning is significantly higher when the amount of time spent in the laboratory is increased, regardless of the amount of time spent in the laboratory. This is true for all three groups of subjects.

The results of the study are presented in Table I. The data show that the rate of learning is significantly higher when the amount of time spent in the laboratory is increased. This is true for all three groups of subjects. The results also show that the rate of learning is significantly higher when the amount of time spent in the laboratory is increased, regardless of the amount of time spent in the laboratory. This is true for all three groups of subjects. The results also show that the rate of learning is significantly higher when the amount of time spent in the laboratory is increased, regardless of the amount of time spent in the laboratory. This is true for all three groups of subjects.

V. CONCLUSIONS

1. The average of the diameters of individual contact areas has an order of magnitude between 1×10^{-4} cm and 4×10^{-4} cm.

2. The diameter of the average area of the individual contact areas has an order of magnitude between 2×10^{-4} cm and 6×10^{-4} cm.

3. Increasing the relative velocity of the surfaces in contact probably increases the size of individual contacts in sliding friction.

4. Increasing the loading probably decreases the size of individual contacts in sliding friction for surfaces finished with 2/0 emery paper.

5. Increasing the roughness of the surface finish probably tends to eliminate the effect of loading on the size of individual contacts in sliding friction.

6. The distribution of contact areas is such that the log of the number of contacts bears a straight line relationship to the log of the average area for intervals of equal area.

7. About 80% of the contact areas have diameters less than 4.3×10^{-5} cm.

8. About 50% of the contact areas have diameters less than 1.4×10^{-5} cm.

VI. RECOMMENDATIONS

1. Further investigation should be made to determine the effect of the deformation of contacts on the contact durations.

2. Further investigation should be made to determine the effect of variables such as relative velocity, surface finish, and loading on the size of individual contacts in sliding friction.

3. Further statistical analysis of the tabulated data should be made for the purpose of explaining the size distribution of the contact areas.

The first part of the report is devoted to a description of the experimental conditions and the results of the measurements. The second part is devoted to a discussion of the results and a comparison with the theoretical predictions.

The experimental conditions were as follows: the temperature was kept constant at 20°C, the pressure was kept constant at 1 atm, and the concentration of the reactants was kept constant at 0.1 mol/l. The results of the measurements are shown in Table 1.

The theoretical predictions are based on the assumption that the reaction is first order with respect to the concentration of the reactants. The results of the calculations are shown in Table 2.

VII. APPENDIX

VI. 1946. IIV

APPENDIX A

Pictures of Experimental Set Up and Sketch of Probe

	Page
Figure 1. Picture, Over All experimental Set Up ...	A 2
Figure 2. Picture, Side View of Wear Machine	A 3
Figure 3. Picture, Close Up of Mounted Probe	A 4
Figure 4. Sketch of Probe	A 5

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11-1-1

11-1-2

11-1-3

11-1-4

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11-1-6

51 1
ver All Experimental Set

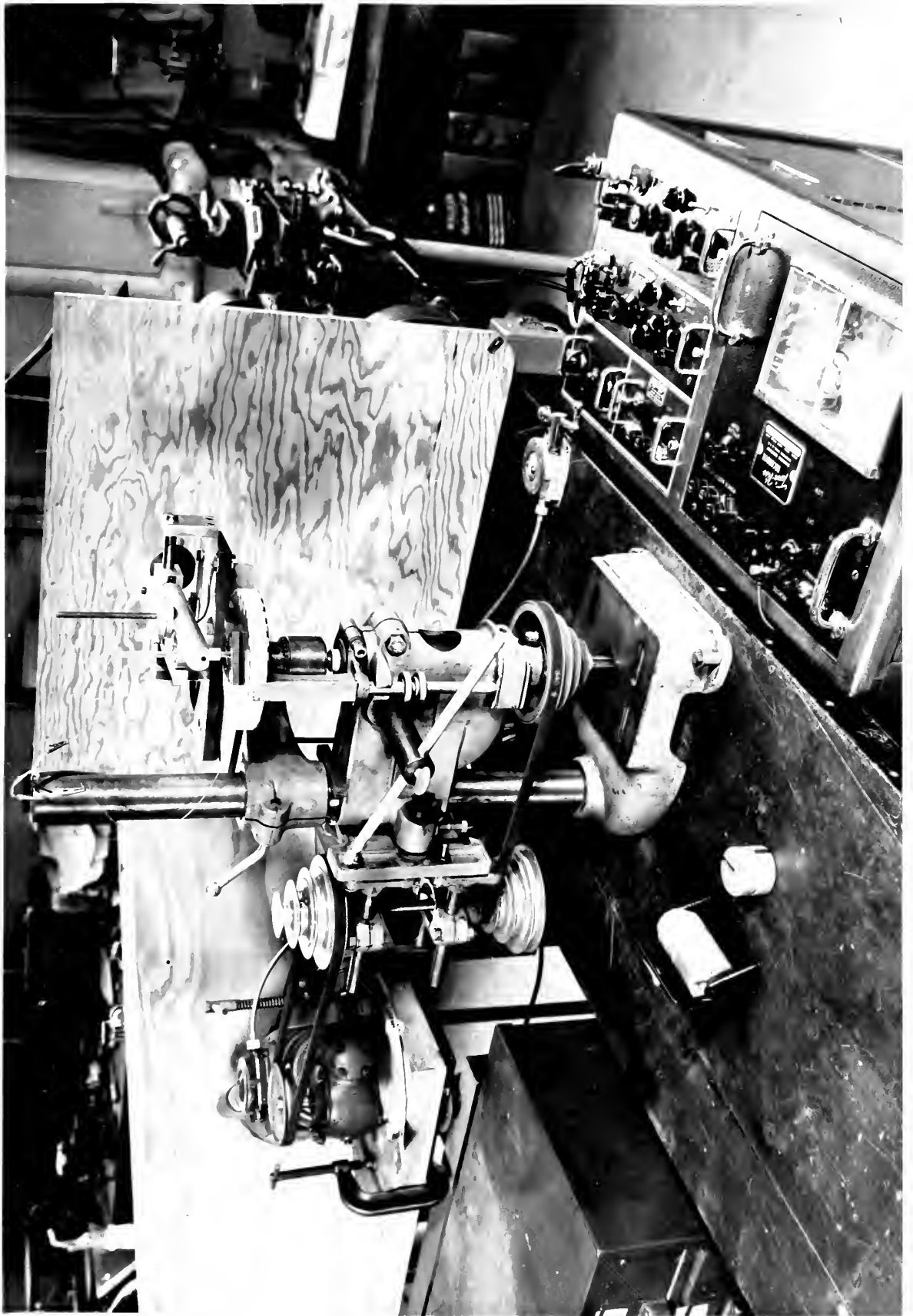


Figure II
Side View of Wear Machine

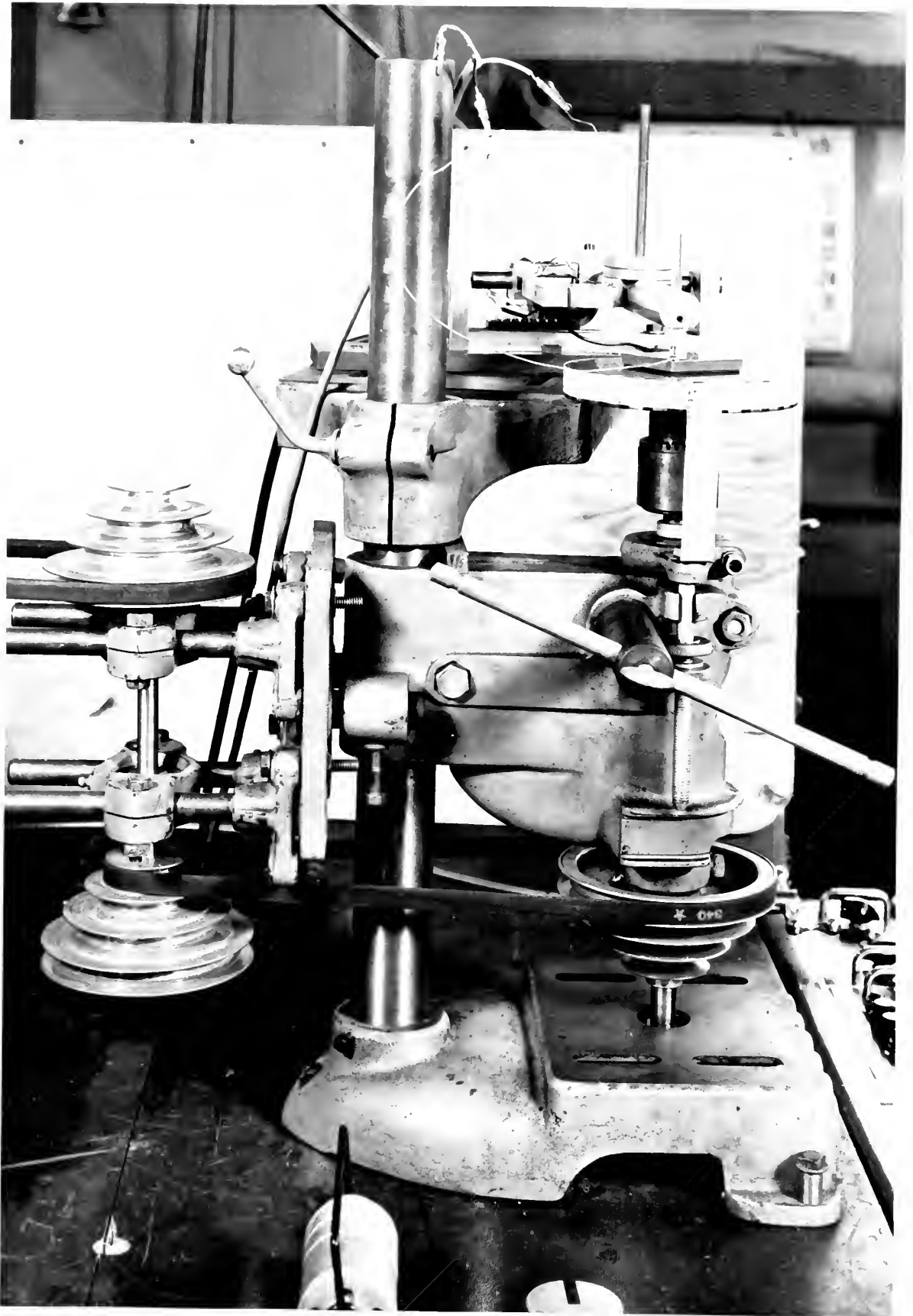


Fig. 3 III
Close Up of Mounted Probe

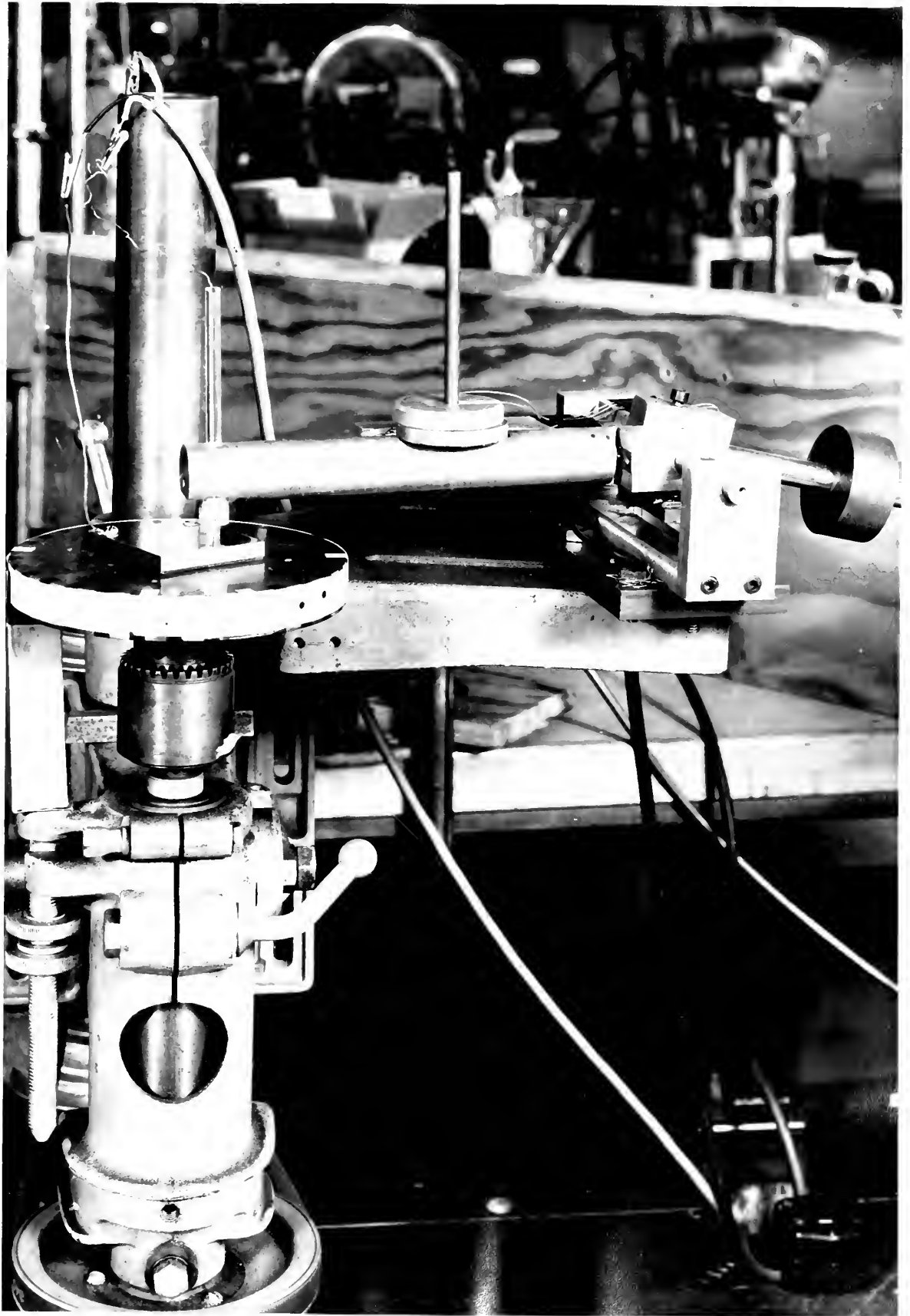
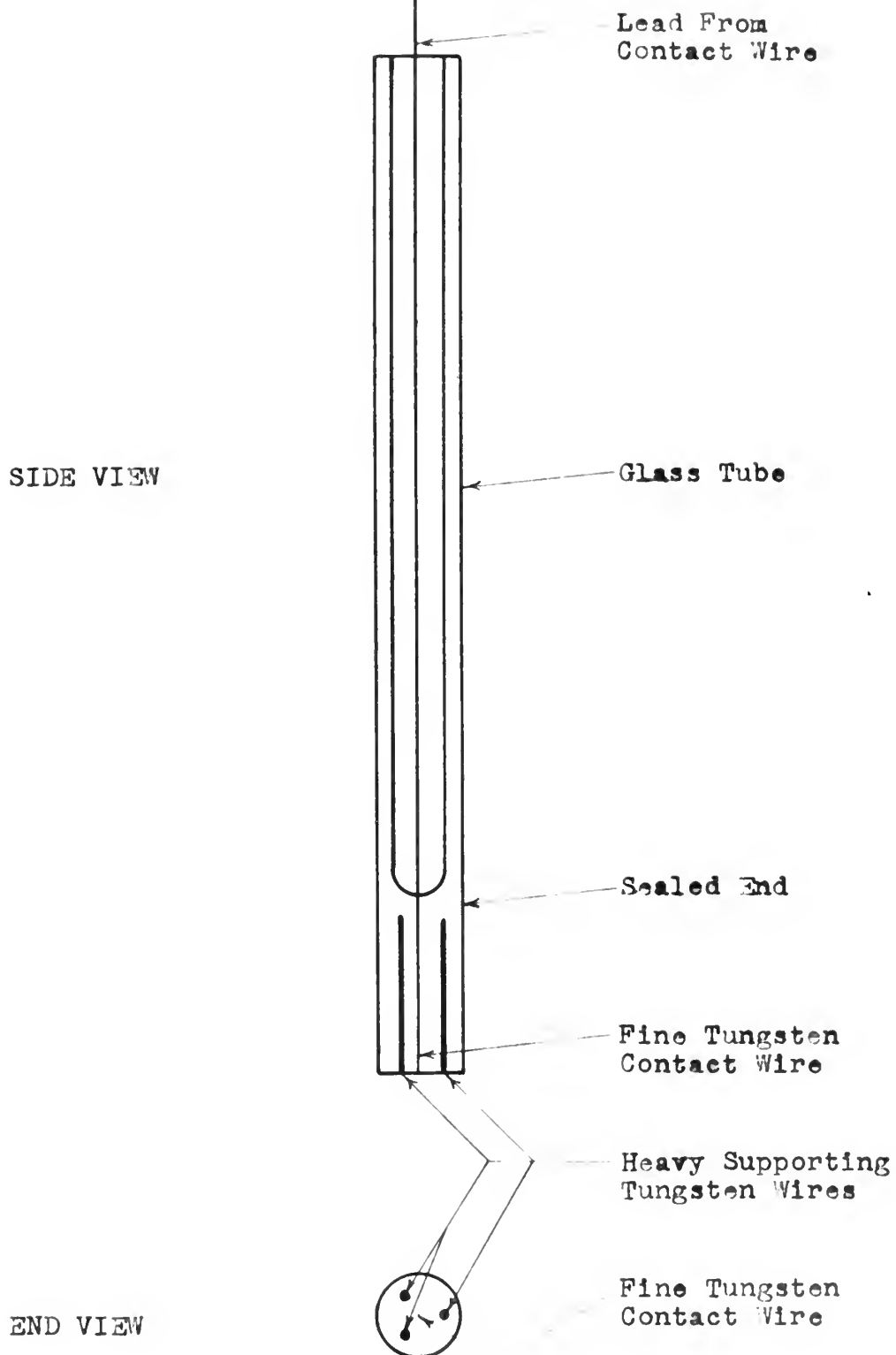




Figure IV

GLASS PROBE (Double the actual size)

APPENDIX B

Representative Tape

Page

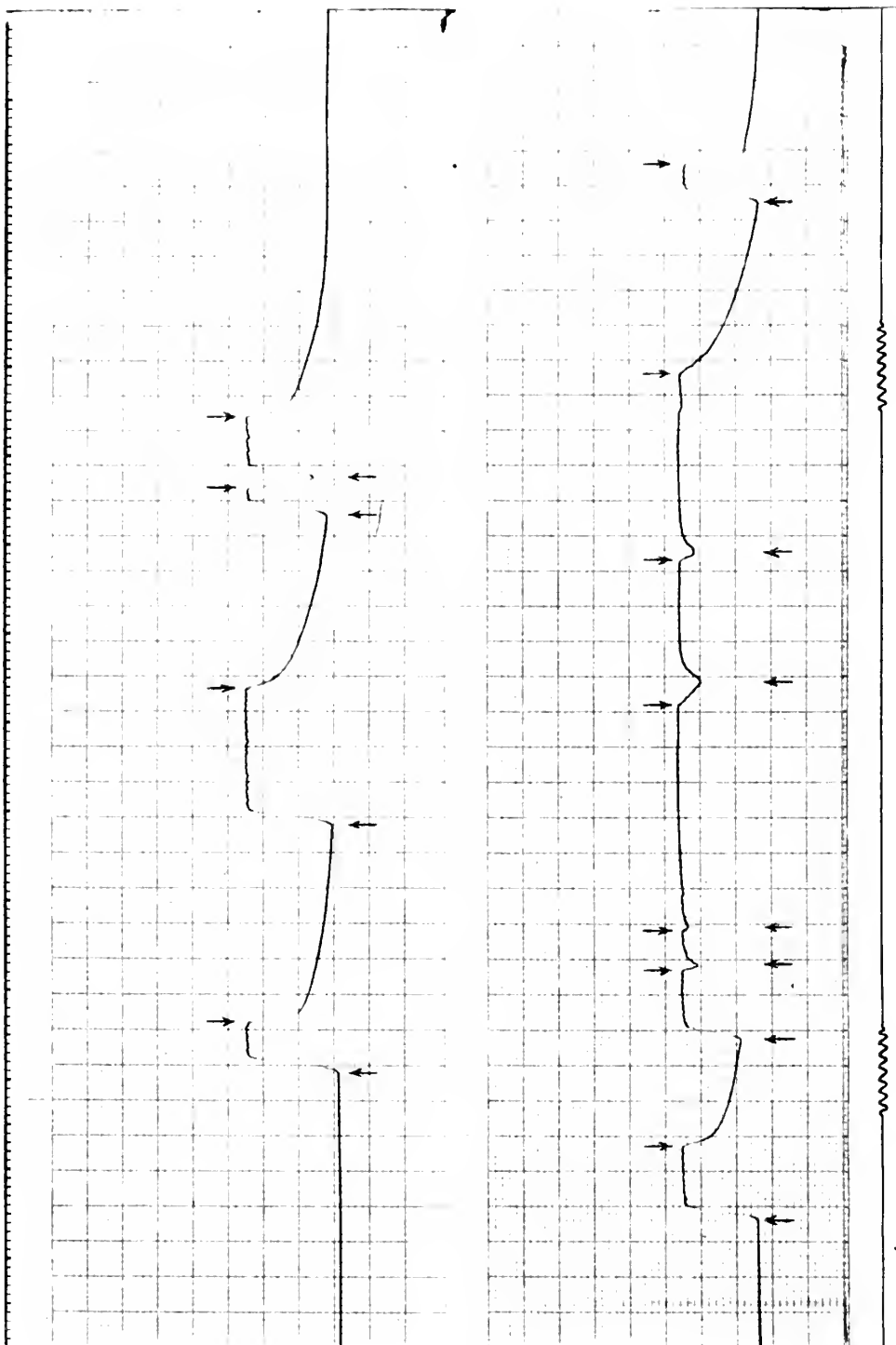
Figure 5. Picture, Representative Tape A 7

Figure 2

representative case

10

Figure 2. Picture, representative case A

Figure V

REPRESENTATIVE TAPE TRACES



APPENDIX C

Graphs of Results

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Figure 7. Plot, Size Distribution of Contact Areas for All Tapes	A 10
Figure 8. Plot, Size Distribution of Contact Areas with Diameters Less Than Probe Diameter	A 11

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Figure VI

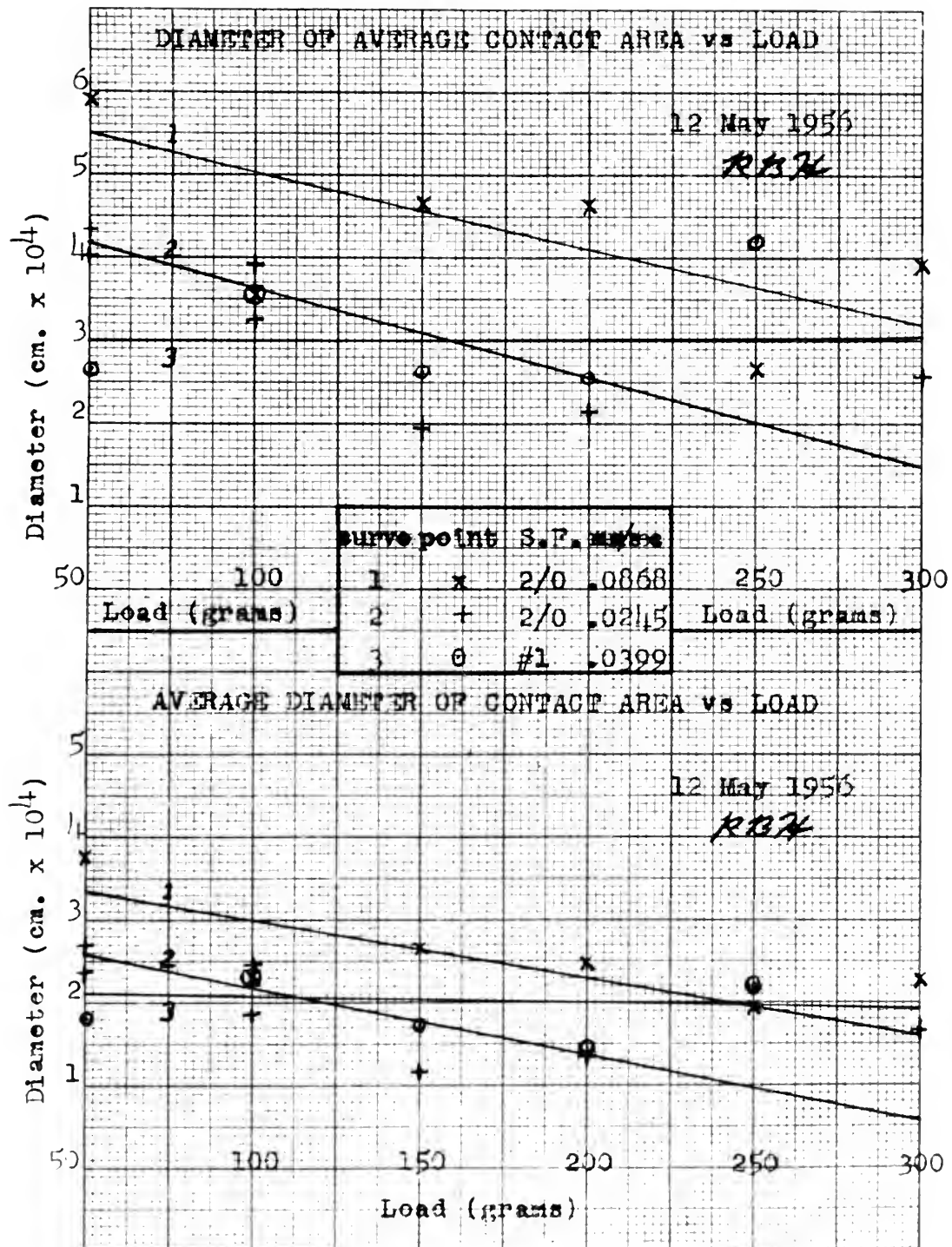




Figure VII

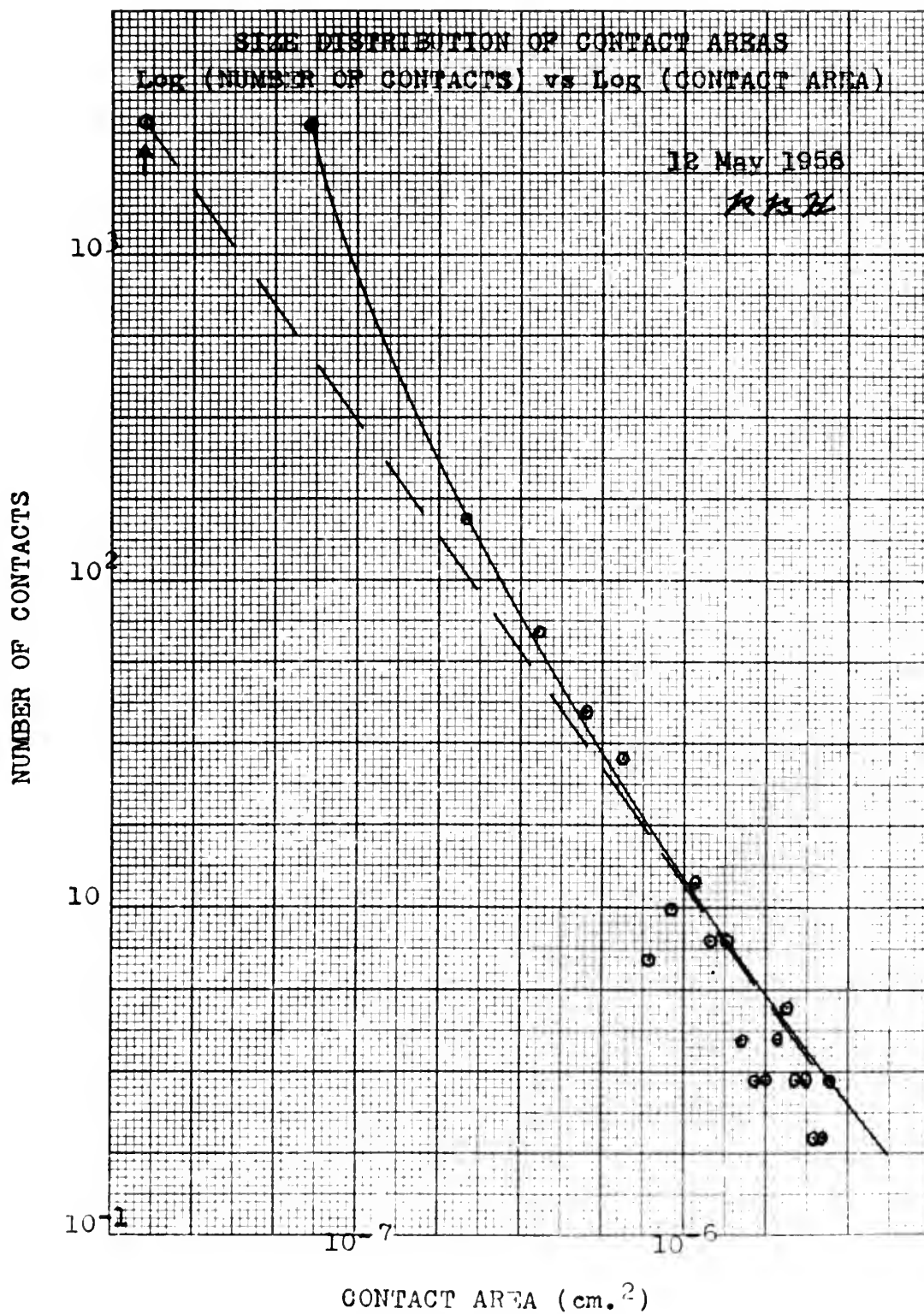
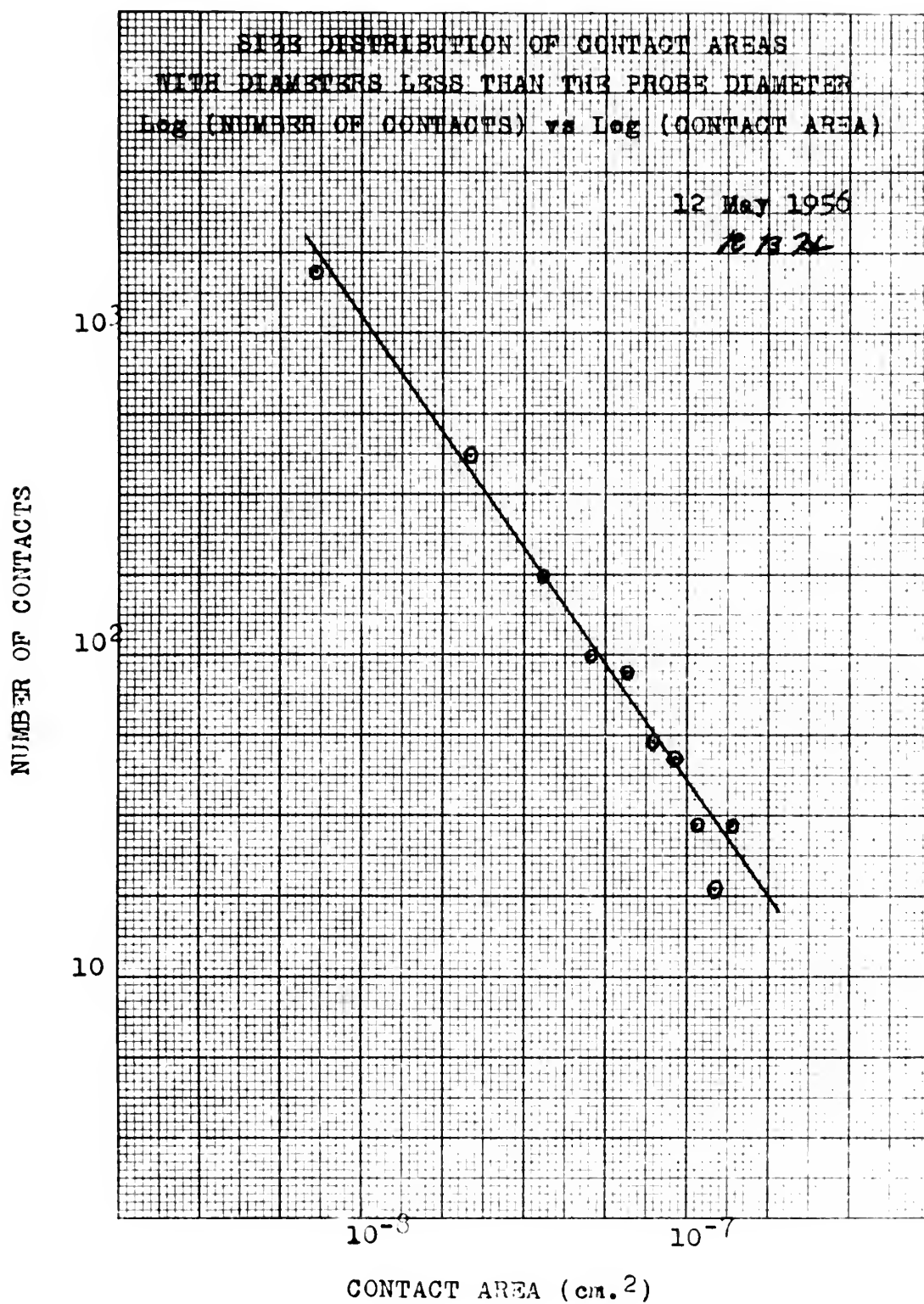


Figure VIII





APPENDIX D

Identification of Tapes - Tabulated Data

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Table	II. Tabulated Data, Tape 1	A 14
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Table	IX. Tabulated Data, Tape 8	A 27
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APPENDIX

APPENDIX I - LIST OF MEMBERS

No.	Name	Age	Address
1	Mr. A. B. C.	35	123 Main St.
2	Mr. D. E. F.	42	456 Elm St.
3	Mr. G. H. I.	28	789 Oak St.
4	Mr. J. K. L.	55	101 Pine St.
5	Mr. M. N. O.	30	234 Maple St.
6	Mr. P. Q. R.	48	567 Birch St.
7	Mr. S. T. U.	33	890 Cedar St.
8	Mr. V. W. X.	50	112 Fir St.
9	Mr. Y. Z. A.	25	345 Gum St.
10	Mr. B. C. D.	40	678 Hickory St.
11	Mr. E. F. G.	38	901 Juniper St.
12	Mr. H. I. J.	52	234 Laurel St.
13	Mr. K. L. M.	29	567 Magnolia St.
14	Mr. N. O. P.	45	890 Norway St.
15	Mr. Q. R. S.	31	112 Palm St.
16	Mr. T. U. V.	47	345 Rose St.
17	Mr. W. X. Y.	36	678 Sycamore St.
18	Mr. Z. A. B.	53	901 Tulip St.
19	Mr. C. D. E.	27	234 Violet St.
20	Mr. F. G. H.	41	567 Willow St.

Table I

IDENTIFICATION OF TAPES AND SUMMARY OF DIAMETER CAL-

Tape No.	SURFACE FINISH	LOAD	CORRELATIONS		DIAMETER OF AVERAGE AREA $\times 10^4$ cm
			VELOCITY $\times 10^2$ mm/sec	AVERAGE DIAMETER $\times 10^4$ cm	
1	2/0	100	2.45	2.37	4.01
2	2/0	100		1.87	4.33
3	2/0	200		2.70	3.24
4	2/0	200		2.46	3.92
5	2/0	300		1.46	1.93
6	2/0	400		1.34	2.13
7	2/0	600		1.67	2.55
8	2/0	100	8.68	3.77	5.90
9	2/0	200		2.30	3.53
10	2/0	300		2.63	4.66
11	2/0	400		2.47	4.62
12	2/0	500		1.93	2.66
13	2/0	600		2.28	3.91
14	1	100	3.99	1.81	2.67
15	1	200		2.33	3.58
16	1	300		1.74	2.61
17	1	400		1.43	2.55
18	1	500		2.21	4.19

Table

Table showing the results of the analysis of the data for the year 1961.

Table 1

Year	Month	Day	Time	Location	Remarks
1961	Jan	1	08.00	01.00	1
1961	Jan	2	08.00	01.00	2
1961	Jan	3	08.00	01.00	3
1961	Jan	4	08.00	01.00	4
1961	Jan	5	08.00	01.00	5
1961	Jan	6	08.00	01.00	6
1961	Jan	7	08.00	01.00	7
1961	Jan	8	08.00	01.00	8
1961	Jan	9	08.00	01.00	9
1961	Jan	10	08.00	01.00	10
1961	Jan	11	08.00	01.00	11
1961	Jan	12	08.00	01.00	12
1961	Jan	13	08.00	01.00	13
1961	Jan	14	08.00	01.00	14
1961	Jan	15	08.00	01.00	15
1961	Jan	16	08.00	01.00	16
1961	Jan	17	08.00	01.00	17
1961	Jan	18	08.00	01.00	18
1961	Jan	19	08.00	01.00	19
1961	Jan	20	08.00	01.00	20
1961	Jan	21	08.00	01.00	21
1961	Jan	22	08.00	01.00	22
1961	Jan	23	08.00	01.00	23
1961	Jan	24	08.00	01.00	24
1961	Jan	25	08.00	01.00	25
1961	Jan	26	08.00	01.00	26
1961	Jan	27	08.00	01.00	27
1961	Jan	28	08.00	01.00	28
1961	Jan	29	08.00	01.00	29
1961	Jan	30	08.00	01.00	30
1961	Jan	31	08.00	01.00	31

Table II

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 1

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	33.8	20	23.7	39	10.0	58	33.8
2	104.0	21	31.2	40	6.0	59	20.2
3	77.0	22	17.3	41	5.6	60	20.8
4	10.0	23	3.0	42	20.2	61	41.0
5	4.9	24	8.0	43	.7	62	8.0
6	8.8	25	2.0	44	16.7	63	5.8
7	17.2	26	9.2	45	5.1	64	4.0
8	19.0	27	5.0	46	77.0	65	10.5
9	155.7	28	6.7	47	5.7	66	61.5
10	72.6	29	59.0	48	29.0	67	4.0
11	15.3	30	18.6	49	3.0	68	4.0
12	9.9	31	5.3	50	3.0	69	16.2
13	4.3	32	5.2	51	4.6	70	8.5
14	2.9	33	5.0	52	4.7	71	5.2
15	8.0	34	38.1	53	34.2	72	4.1
16	2.6	35	42.1	54	39.1	73	11.7
17	3.0	36	6.1	55	17.9	74	3.3
18	1.0	37	6.5	56	11.4	75	12.0
19	24.2	38	4.6	57	5.2		

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Table III

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 2

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	12.3	26	2.0	51	6.0	76	11.5
2	8.5	27	28.3	52	6.9	77	12.8
3	26.6	28	2.8	53	13.1	78	1.9
4	21.7	29	105.6	54	8.8	79	27.2
5	64.4	30	27.7	55	4.8	80	34.6
6	10.5	31	12.0	56	15.0	81	18.7
7	16.0	32	1.7	57	34.6	82	19.3
8	76.1	33	12.5	58	21.0	83	6.7
9	10.5	34	10.7	59	11.6	84	54.5
10	33.3	35	10.8	60	13.0	85	101.8
11	4.8	36	6.7	61	15.3	86	94.4
12	6.7	37	6.9	62	52.0	87	11.2
13	48.8	38	4.7	63	5.2	88	15.1
14	8.0	39	11.6	64	44.3	89	44.5
15	68.5	40	30.5	65	21.0	90	37.0
16	45.4	41	3.0	66	53.0	91	27.9
17	7.9	42	1.7	67	3.3	92	21.7
18	2.7	43	1.4	68	3.8	93	19.5
19	1.8	44	14.4	69	3.1	94	46.1
20	39.8	45	4.0	70	16.0	95	10.0
21	7.8	46	10.9	71	8.3	96	2.1
22	8.7	47	43.8	72	10.6	97	5.7
23	53.0	48	34.0	73	6.0	98	10.1
24	5.2	49	3.0	74	13.3	99	1.8
25	0.1	50	5.4	75	2.5	100	57.7

Table III

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 2

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	2.6	118	52.6	135	4.0	151	4.1
102	19.1	119	12.1	136	53.2	152	8.9
103	104.6	120	55.1	137	6.4	153	1.2
104	86.5	121	15.3	138	21.5	154	6.7
105	110.5	122	72.9	139	3.0	155	5.6
106	7.7	123	36.5	140	6.4	156	14.3
107	54.1	124	2.4	141	9.0	157	2.0
108	157.3	125	7.1	142	3.4	158	6.0
109	116.0	126	6.3	143	14.1	159	10.0
110	10.1	127	5.4	144	8.7	160	4.1
111	23.0	128	31.0	145	3.7	161	4.2
112	5.2	129	7.3	146	5.0	162	3.4
113	39.2	130	31.9	147	14.4	163	8.2
114	46.0	131	5.2	148	20.3	164	4.2
115	30.0	132	11.1	149	17.6	165	2.0
116	12.4	133	11.4	150	3.4	166	4.2
117	47.9	134	5.0				

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S. J. W. 1007-1011 (1981) 6-10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841,

[illegible]

Table IV

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 3

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	32.1	16	20.5	31	3.8	46	5.2
2	4.3	17	6.0	32	62.7	47	3.9
3	5.4	18	5.5	33	3.4	48	7.4
4	5.5	19	1.0	34	6.1	49	23.0
5	3.6	20	1.5	35	3.9	50	23.2
6	15.1	21	5.2	36	3.9	51	11.7
7	7.3	22	17.1	37	7.8	52	71.2
8	74.9	23	5.6	38	4.3	53	23.6
9	12.0	24	11.5	39	12.4	54	6.2
10	11.1	25	4.0	40	10.9	55	10.4
11	13.2	26	3.9	41	4.8	56	6.8
12	10.1	27	4.8	42	15.3	57	3.2
13	5.8	28	2.9	43	24.0	58	9.6
14	5.9	29	5.9	44	23.5	59	47.1
15	3.0	30	36.6	45	115.1		

Table VI

Calculated values of the function $f(x)$ for various values of x

x	$f(x)$	$f'(x)$	$f''(x)$	$f'''(x)$	$f^{(4)}(x)$	$f^{(5)}(x)$	$f^{(6)}(x)$
0.0	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.0950	0.9048	0.0950	0.0095	0.0005	0.0000	0.0000
0.2	0.3679	0.7165	0.3679	0.0717	0.0047	0.0002	0.0000
0.3	0.5834	0.5488	0.5834	0.1771	0.0149	0.0008	0.0000
0.4	0.6703	0.4493	0.6703	0.2707	0.0243	0.0012	0.0000
0.5	0.6321	0.3750	0.6321	0.3247	0.0243	0.0012	0.0000
0.6	0.5000	0.3187	0.5000	0.3247	0.0243	0.0012	0.0000
0.7	0.3499	0.2770	0.3499	0.2770	0.0243	0.0012	0.0000
0.8	0.2019	0.2466	0.2019	0.2019	0.0243	0.0012	0.0000
0.9	0.1188	0.2231	0.1188	0.1188	0.0243	0.0012	0.0000
1.0	0.0670	0.2048	0.0670	0.0670	0.0243	0.0012	0.0000
1.1	0.0368	0.1912	0.0368	0.0368	0.0243	0.0012	0.0000
1.2	0.0203	0.1808	0.0203	0.0203	0.0243	0.0012	0.0000
1.3	0.0110	0.1725	0.0110	0.0110	0.0243	0.0012	0.0000
1.4	0.0057	0.1658	0.0057	0.0057	0.0243	0.0012	0.0000
1.5	0.0030	0.1604	0.0030	0.0030	0.0243	0.0012	0.0000
1.6	0.0016	0.1561	0.0016	0.0016	0.0243	0.0012	0.0000
1.7	0.0008	0.1527	0.0008	0.0008	0.0243	0.0012	0.0000
1.8	0.0004	0.1500	0.0004	0.0004	0.0243	0.0012	0.0000
1.9	0.0002	0.1478	0.0002	0.0002	0.0243	0.0012	0.0000
2.0	0.0001	0.1461	0.0001	0.0001	0.0243	0.0012	0.0000

Table V

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 4

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	54.3	26	9.2	51	47.2	76	7.9
2	110.2	27	5.2	52	23.5	77	7.6
3	3.5	28	14.3	53	51.0	78	17.8
4	23.0	29	11.6	54	66.1	79	7.5
5	3.1	30	7.4	55	34.7	80	17.5
6	205.0	31	5.9	56	8.8	81	7.7
7	32.0	32	22.3	57	8.2	82	11.6
8	2.0	33	14.1	58	16.3	83	60.1
9	3.0	34	93.5	59	13.1	84	39.6
10	11.0	35	2.4	60	11.0	85	13.4
11	7.0	36	136.0	61	7.9	86	6.1
12	24.3	37	22.9	62	12.3	87	41.4
13	48.4	38	28.3	63	24.6	88	2.0
14	96.5	39	14.0	64	7.3	89	6.7
15	68.3	40	11.9	65	24.0	90	8.1
16	31.7	41	58.7	66	4.3	91	2.1
17	7.4	42	49.3	67	7.0	92	16.2
18	11.3	43	9.0	68	16.2	93	25.7
19	7.0	44	12.5	69	3.9	94	12.6
20	3.8	45	34.0	70	14.0	95	4.1
21	2.5	46	17.4	71	11.8	96	30.0
22	2.0	47	9.8	72	4.0	97	11.0
23	7.6	48	30.3	73	5.8	98	13.0
24	8.3	49	6.8	74	10.2	99	1.1
25	47.0	50	15.3	75	6.2	100	5.5

Table V

TABLE CONTAINING THE DATA FOR THE NO. 4

NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE
1	24.3	5	24.3	9	24.3	13	24.3
2	110.5	6	24.3	10	24.3	14	24.3
3	2.3	7	24.3	11	24.3	15	24.3
4	23.0	8	24.3	12	24.3	16	24.3
5	2.1	9	24.3	13	24.3	17	24.3
6	0.205	10	24.3	14	24.3	18	24.3
7	0.25	11	24.3	15	24.3	19	24.3
8	5.0	12	24.3	16	24.3	20	24.3
9	2.0	13	24.3	17	24.3	21	24.3
10	0.11	14	24.3	18	24.3	22	24.3
11	0.8	15	24.3	19	24.3	23	24.3
12	0.8	16	24.3	20	24.3	24	24.3
13	0.8	17	24.3	21	24.3	25	24.3
14	0.8	18	24.3	22	24.3	26	24.3
15	0.8	19	24.3	23	24.3	27	24.3
16	0.8	20	24.3	24	24.3	28	24.3
17	0.8	21	24.3	25	24.3	29	24.3
18	0.8	22	24.3	26	24.3	30	24.3
19	0.8	23	24.3	27	24.3	31	24.3
20	0.8	24	24.3	28	24.3	32	24.3
21	0.8	25	24.3	29	24.3	33	24.3
22	0.8	26	24.3	30	24.3	34	24.3
23	0.8	27	24.3	31	24.3	35	24.3
24	0.8	28	24.3	32	24.3	36	24.3
25	0.8	29	24.3	33	24.3	37	24.3
26	0.8	30	24.3	34	24.3	38	24.3
27	0.8	31	24.3	35	24.3	39	24.3
28	0.8	32	24.3	36	24.3	40	24.3
29	0.8	33	24.3	37	24.3	41	24.3
30	0.8	34	24.3	38	24.3	42	24.3
31	0.8	35	24.3	39	24.3	43	24.3
32	0.8	36	24.3	40	24.3	44	24.3
33	0.8	37	24.3	41	24.3	45	24.3
34	0.8	38	24.3	42	24.3	46	24.3
35	0.8	39	24.3	43	24.3	47	24.3
36	0.8	40	24.3	44	24.3	48	24.3
37	0.8	41	24.3	45	24.3	49	24.3
38	0.8	42	24.3	46	24.3	50	24.3
39	0.8	43	24.3	47	24.3	51	24.3
40	0.8	44	24.3	48	24.3	52	24.3
41	0.8	45	24.3	49	24.3	53	24.3
42	0.8	46	24.3	50	24.3	54	24.3
43	0.8	47	24.3	51	24.3	55	24.3
44	0.8	48	24.3	52	24.3	56	24.3
45	0.8	49	24.3	53	24.3	57	24.3
46	0.8	50	24.3	54	24.3	58	24.3
47	0.8	51	24.3	55	24.3	59	24.3
48	0.8	52	24.3	56	24.3	60	24.3
49	0.8	53	24.3	57	24.3	61	24.3
50	0.8	54	24.3	58	24.3	62	24.3
51	0.8	55	24.3	59	24.3	63	24.3
52	0.8	56	24.3	60	24.3	64	24.3
53	0.8	57	24.3	61	24.3	65	24.3
54	0.8	58	24.3	62	24.3	66	24.3
55	0.8	59	24.3	63	24.3	67	24.3
56	0.8	60	24.3	64	24.3	68	24.3
57	0.8	61	24.3	65	24.3	69	24.3
58	0.8	62	24.3	66	24.3	70	24.3
59	0.8	63	24.3	67	24.3	71	24.3
60	0.8	64	24.3	68	24.3	72	24.3
61	0.8	65	24.3	69	24.3	73	24.3
62	0.8	66	24.3	70	24.3	74	24.3
63	0.8	67	24.3	71	24.3	75	24.3
64	0.8	68	24.3	72	24.3	76	24.3
65	0.8	69	24.3	73	24.3	77	24.3
66	0.8	70	24.3	74	24.3	78	24.3
67	0.8	71	24.3	75	24.3	79	24.3
68	0.8	72	24.3	76	24.3	80	24.3
69	0.8	73	24.3	77	24.3	81	24.3
70	0.8	74	24.3	78	24.3	82	24.3
71	0.8	75	24.3	79	24.3	83	24.3
72	0.8	76	24.3	80	24.3	84	24.3
73	0.8	77	24.3	81	24.3	85	24.3
74	0.8	78	24.3	82	24.3	86	24.3
75	0.8	79	24.3	83	24.3	87	24.3
76	0.8	80	24.3	84	24.3	88	24.3
77	0.8	81	24.3	85	24.3	89	24.3
78	0.8	82	24.3	86	24.3	90	24.3
79	0.8	83	24.3	87	24.3	91	24.3
80	0.8	84	24.3	88	24.3	92	24.3
81	0.8	85	24.3	89	24.3	93	24.3
82	0.8	86	24.3	90	24.3	94	24.3
83	0.8	87	24.3	91	24.3	95	24.3
84	0.8	88	24.3	92	24.3	96	24.3
85	0.8	89	24.3	93	24.3	97	24.3
86	0.8	90	24.3	94	24.3	98	24.3
87	0.8	91	24.3	95	24.3	99	24.3
88	0.8	92	24.3	96	24.3	100	24.3
89	0.8	93	24.3	97	24.3		
90	0.8	94	24.3	98	24.3		
91	0.8	95	24.3	99	24.3		
92	0.8	96	24.3	100	24.3		
93	0.8	97	24.3				
94	0.8	98	24.3				
95	0.8	99	24.3				
96	0.8	100	24.3				
97	0.8						
98	0.8						
99	0.8						
100	0.8						

Table V

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 4

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	2.6	109	5.5	117	12.3	125	6.5
102	12.6	110	2.3	118	3.5	126	36.0
103	28.9	111	10.7	119	9.0	127	9.0
104	6.1	112	2.2	120	13.9	128	4.8
105	3.0	113	6.5	121	3.2	129	3.2
106	7.0	114	3.1	122	55.9	130	7.8
107	8.9	115	11.0	123	25.4	131	9.6
108	4.6	116	6.0	124	4.0		

Table VI

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 5

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	3.6	26	10.5	51	4.1	76	8.9
2	5.3	27	2.5	52	7.1	77	8.4
3	7.7	28	4.5	53	6.0	78	9.0
4	18.8	29	11.1	54	.8	79	10.7
5	4.4	30	7.2	55	3.9	80	4.3
6	3.1	31	15.5	56	3.0	81	14.7
7	4.7	32	5.3	57	20.0	82	7.9
8	4.7	33	15.5	58	25.1	83	25.8
9	15.2	34	6.0	59	13.4	84	4.6
10	25.5	35	4.5	60	4.0	85	11.0
11	3.5	36	3.8	61	7.3	86	5.4
12	3.6	37	8.1	62	22.6	87	3.0
13	4.2	38	7.1	63	6.0	88	4.3
14	5.3	39	5.8	64	20.3	89	3.4
15	3.0	40	2.3	65	8.5	90	10.0
16	19.1	41	11.0	66	12.7	91	3.9
17	7.1	42	2.0	67	5.2	92	6.3
18	4.0	43	4.1	68	7.0	93	5.0
19	3.5	44	5.8	69	14.2	94	5.1
20	10.7	45	2.0	70	5.0	95	5.0
21	19.1	46	4.0	71	3.8	96	10.2
22	5.0	47	3.0	72	7.9	97	3.4
23	2.2	48	2.0	73	3.1	98	11.7
24	1.0	49	2.0	74	3.9	99	12.2
25	5.0	50	3.5	75	15.5	100	5.2

Table 1

TABLE 1. (a) (b) (c) (d) (e) (f) (g) (h)

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1.0	0.5	1.2	1.0	0.8	0.5	0.5	1
1.0	1.0	1.1	0.5	0.5	0.5	0.5	5
1.0	1.5	0.8	0.5	0.5	0.5	1.0	5
1.0	2.0	0.5	0.5	1.1	0.5	0.5	5
1.0	2.5	0.5	0.5	0.5	0.5	0.5	5
1.0	3.0	0.5	0.5	0.5	0.5	0.5	5
1.0	3.5	0.5	0.5	0.5	0.5	0.5	5
1.0	4.0	0.5	0.5	0.5	0.5	0.5	5
1.0	4.5	0.5	0.5	0.5	0.5	0.5	5
1.0	5.0	0.5	0.5	0.5	0.5	0.5	5
1.0	5.5	0.5	0.5	0.5	0.5	0.5	5
1.0	6.0	0.5	0.5	0.5	0.5	0.5	5
1.0	6.5	0.5	0.5	0.5	0.5	0.5	5
1.0	7.0	0.5	0.5	0.5	0.5	0.5	5
1.0	7.5	0.5	0.5	0.5	0.5	0.5	5
1.0	8.0	0.5	0.5	0.5	0.5	0.5	5
1.0	8.5	0.5	0.5	0.5	0.5	0.5	5
1.0	9.0	0.5	0.5	0.5	0.5	0.5	5
1.0	9.5	0.5	0.5	0.5	0.5	0.5	5
1.0	10.0	0.5	0.5	0.5	0.5	0.5	5
1.0	10.5	0.5	0.5	0.5	0.5	0.5	5
1.0	11.0	0.5	0.5	0.5	0.5	0.5	5
1.0	11.5	0.5	0.5	0.5	0.5	0.5	5
1.0	12.0	0.5	0.5	0.5	0.5	0.5	5
1.0	12.5	0.5	0.5	0.5	0.5	0.5	5
1.0	13.0	0.5	0.5	0.5	0.5	0.5	5
1.0	13.5	0.5	0.5	0.5	0.5	0.5	5
1.0	14.0	0.5	0.5	0.5	0.5	0.5	5
1.0	14.5	0.5	0.5	0.5	0.5	0.5	5
1.0	15.0	0.5	0.5	0.5	0.5	0.5	5
1.0	15.5	0.5	0.5	0.5	0.5	0.5	5
1.0	16.0	0.5	0.5	0.5	0.5	0.5	5
1.0	16.5	0.5	0.5	0.5	0.5	0.5	5
1.0	17.0	0.5	0.5	0.5	0.5	0.5	5
1.0	17.5	0.5	0.5	0.5	0.5	0.5	5
1.0	18.0	0.5	0.5	0.5	0.5	0.5	5
1.0	18.5	0.5	0.5	0.5	0.5	0.5	5
1.0	19.0	0.5	0.5	0.5	0.5	0.5	5
1.0	19.5	0.5	0.5	0.5	0.5	0.5	5
1.0	20.0	0.5	0.5	0.5	0.5	0.5	5

Table VI

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 5

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	2.3	126	7.0	151	6.4	176	5.8
102	15.0	127	2.4	152	20.6	177	11.4
103	5.1	128	6.0	153	4.9	178	13.1
104	24.3	129	8.7	154	22.2	179	3.8
105	5.2	130	3.4	155	7.0	180	5.9
106	4.1	131	2.0	156	7.6	181	5.8
107	2.2	132	6.2	157	9.2	182	3.1
108	23.5	133	8.3	158	11.4	183	3.3
109	5.5	134	5.5	159	7.2	184	2.3
110	6.7	135	5.6	160	2.5	185	5.0
111	35.0	136	7.0	161	5.3	186	9.5
112	14.5	137	15.0	162	3.7	187	8.2
113	5.0	138	4.6	163	7.5	188	17.3
114	1.9	139	4.0	164	10.5	189	10.9
115	3.2	140	14.0	165	9.0	190	7.1
116	2.9	141	8.4	166	0.5	191	78.7
117	2.1	142	3.8	167	5.5	192	11.9
118	1.0	143	5.7	168	1.2	193	29.5
119	7.0	144	1.0	169	39.6	194	14.8
120	18.1	145	22.3	170	10.2	195	10.5
121	21.2	146	7.3	171	23.9	196	3.9
122	12.5	147	7.0	172	2.4	197	5.3
123	15.4	148	10.5	173	8.0	198	.8
124	5.8	149	8.5	174	3.2	199	12.2
125	4.0	150	6.5	175	1.0	200	20.8

Table VI

TABLE OF CONTACT DISTANCES (MM) FOR 1000 NO. 1

NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE
101	2.3	151	1.0	201	2.4	251	2.5
102	12.0	152	2.4	202	2.5	252	12.1
103	2.1	153	2.0	203	2.6	253	12.1
104	2.45	154	2.7	204	2.55	254	2.8
105	2.2	155	2.4	205	1.0	255	2.0
106	4.1	156	2.2	206	2.8	256	2.0
107	2.8	157	2.8	207	2.8	257	2.1
108	2.25	158	2.2	208	11.4	258	2.2
109	2.2	159	2.2	209	1.5	259	2.2
110	2.5	160	2.0	210	2.2	260	2.0
111	22.0	161	1.0	211	2.2	261	2.0
112	14.2	162	0.25	212	2.1	262	2.0
113	2.0	163	2.4	213	2.2	263	2.0
114	1.1	164	0.4	214	0.4	264	2.0
115	2.8	165	0.45	215	2.0	265	2.0
116	2.9	166	2.4	216	2.0	266	2.0
117	2.1	167	2.8	217	2.0	267	2.0
118	1.0	168	2.1	218	2.0	268	2.0
119	1.0	169	2.0	219	2.0	269	2.0
120	12.1	170	2.2	220	2.0	270	2.0
121	2.8	171	2.7	221	2.0	271	2.0
122	2.2	172	2.0	222	2.0	272	2.0
123	2.4	173	2.0	223	2.0	273	2.0
124	2.0	174	2.0	224	2.0	274	2.0
125	2.0	175	2.0	225	2.0	275	2.0
126	2.0	176	2.0	226	2.0	276	2.0
127	2.0	177	2.0	227	2.0	277	2.0
128	2.0	178	2.0	228	2.0	278	2.0
129	2.0	179	2.0	229	2.0	279	2.0
130	2.0	180	2.0	230	2.0	280	2.0
131	2.0	181	2.0	231	2.0	281	2.0
132	2.0	182	2.0	232	2.0	282	2.0
133	2.0	183	2.0	233	2.0	283	2.0
134	2.0	184	2.0	234	2.0	284	2.0
135	2.0	185	2.0	235	2.0	285	2.0
136	2.0	186	2.0	236	2.0	286	2.0
137	2.0	187	2.0	237	2.0	287	2.0
138	2.0	188	2.0	238	2.0	288	2.0
139	2.0	189	2.0	239	2.0	289	2.0
140	2.0	190	2.0	240	2.0	290	2.0

Table VI

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 5

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
201	14.0	216	19.1	231	10.0	246	5.6
202	22.2	217	5.1	232	23.9	247	10.7
203	2.3	218	4.4	233	3.9	248	13.7
204	15.8	219	10.5	234	12.0	249	6.6
205	5.8	220	24.3	235	15.9	250	144.7
206	5.4	221	4.3	236	5.1	251	10.0
207	2.8	222	5.6	237	6.0	252	10.9
208	2.2	223	3.1	238	2.7	253	9.7
209	3.6	224	27.2	239	4.0	254	7.2
210	9.0	225	8.3	240	26.0	255	8.9
211	4.0	226	9.3	241	40.3	256	8.7
212	5.3	227	20.6	242	8.7	257	2.0
213	3.8	228	2.0	243	10.3	258	4.6
214	5.0	229	2.5	244	3.3	259	4.6
215	4.0	230	4.0	245	9.6	260	34.0

Table VII

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 6

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	118.5	26	8.5	51	5.0	76	12.2
2	14.9	27	1.0	52	17.7	77	14.8
3	7.0	28	5.1	53	5.3	78	20.4
4	15.7	29	5.9	54	5.0	79	38.6
5	22.2	30	3.6	55	11.9	80	2.6
6	3.6	31	4.1	56	9.7	81	10.8
7	23.5	32	5.0	57	3.8	82	15.0
8	15.1	33	5.6	58	10.0	83	5.7
9	10.0	34	34.0	59	10.1	84	39.8
10	25.6	35	12.7	60	8.3	85	5.9
11	28.8	36	9.0	61	5.6	86	2.6
12	21.0	37	14.0	62	12.0	87	1.8
13	24.0	38	12.1	63	2.0	88	1.5
14	8.5	39	7.1	64	3.1	89	7.0
15	2.2	40	31.1	65	2.1	90	2.8
16	3.7	41	5.4	66	3.8	91	2.4
17	7.2	42	10.6	67	7.1	92	12.0
18	5.6	43	8.1	68	9.5	93	14.7
19	5.5	44	3.7	69	3.9	94	3.6
20	8.0	45	3.0	70	3.7	95	8.6
21	7.6	46	49.1	71	5.0	96	1.7
22	7.2	47	3.8	72	23.6	97	7.2
23	5.6	48	5.5	73	10.1	98	2.7
24	6.0	49	3.7	74	22.3	99	10.2
25	4.0	50	3.6	75	18.0	100	5.0

Table 1

TABLE 1. (continued) (mm)

NO.	STATION	NO.	STATION	NO.	STATION	NO.	STATION
1	118.5	25	8.5	21	2.0	16	18.5
2	14.3	26	1.0	22	13.3	17	14.3
3	1.0	27	2.1	23	2.3	18	10.8
4	12.3	28	0.9	24	2.0	19	38.8
5	25.1	29	3.8	25	11.9	20	7.6
6	3.8	30	4.1	26	2.3	21	19.3
7	23.2	31	2.6	27	3.2	22	12.0
8	12.1	32	2.2	28	10.0	23	2.3
9	10.0	33	0.8	29	10.1	24	22.8
10	22.0	34	18.1	30	2.3	25	2.2
11	2.3	35	2.0	31	1.0	26	2.0
12	21.0	36	12.0	32	12.0	27	1.8
13	0.8	37	12.1	33	0.5	28	1.2
14	2.2	38	1.3	34	3.1	29	0.3
15	2.2	39	21.1	35	1.3	30	2.8
16	2.3	40	2.2	36	2.2	31	2.4
17	1.5	41	10.0	37	1.1	32	1.0
18	2.0	42	2.3	38	2.3	33	14.1
19	2.2	43	1.3	39	2.3	34	2.3
20	0.8	44	0.5	40	0.5	35	2.3
21	2.3	45	1.0	41	1.0	36	1.3
22	1.5	46	1.3	42	1.3	37	2.3
23	2.3	47	1.3	43	1.3	38	2.3
24	2.3	48	1.3	44	1.3	39	2.3
25	2.3	49	1.3	45	1.3	40	2.3

Table VII

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 6

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	49.1	120	45.8	139	5.9	158	10.8
102	10.5	121	17.2	140	2.9	159	5.0
103	15.1	122	4.6	141	7.0	160	9.8
104	26.6	123	10.0	142	4.5	161	3.2
105	4.6	124	1.1	143	4.0	162	4.8
106	13.0	125	9.8	144	16.2	163	3.5
107	4.1	126	12.0	145	12.5	164	1.2
108	3.0	127	5.5	146	12.0	165	2.2
109	2.0	128	11.2	147	4.0	166	3.2
110	6.9	129	2.6	148	5.2	167	2.4
111	4.0	130	1.0	149	11.5	168	3.3
112	8.1	131	6.7	150	6.0	169	11.8
113	1.8	132	5.3	151	5.3	170	7.8
114	24.1	133	4.6	152	2.6	171	4.7
115	30.5	134	5.1	153	3.9	172	36.0
116	4.2	135	32.3	154	23.0	173	41.0
117	4.1	136	5.9	155	27.0	174	7.5
118	4.1	137	9.0	156	12.8	175	2.5
119	17.3	138	12.1	157	20.0		

TABLE VII

TABLE OF DISTANCES (MILES) BETWEEN PORTS

PORT	DISTANCE	PORT	DISTANCE	PORT	DISTANCE	PORT	DISTANCE
101	10.0	101	10.0	101	10.0	101	10.0
102	10.0	102	10.0	102	10.0	102	10.0
103	10.0	103	10.0	103	10.0	103	10.0
104	10.0	104	10.0	104	10.0	104	10.0
105	10.0	105	10.0	105	10.0	105	10.0
106	10.0	106	10.0	106	10.0	106	10.0
107	10.0	107	10.0	107	10.0	107	10.0
108	10.0	108	10.0	108	10.0	108	10.0
109	10.0	109	10.0	109	10.0	109	10.0
110	10.0	110	10.0	110	10.0	110	10.0
111	10.0	111	10.0	111	10.0	111	10.0
112	10.0	112	10.0	112	10.0	112	10.0
113	10.0	113	10.0	113	10.0	113	10.0
114	10.0	114	10.0	114	10.0	114	10.0
115	10.0	115	10.0	115	10.0	115	10.0
116	10.0	116	10.0	116	10.0	116	10.0
117	10.0	117	10.0	117	10.0	117	10.0
118	10.0	118	10.0	118	10.0	118	10.0
119	10.0	119	10.0	119	10.0	119	10.0

Table VIII

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 7

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	37.0	26	8.3	51	1.7	76	6.6
2	4.0	27	10.0	52	39.0	77	39.7
3	4.0	28	6.0	53	11.4	78	16.0
4	10.8	29	3.7	54	17.0	79	12.1
5	4.1	30	46.0	55	45.5	80	8.7
6	12.0	31	5.8	56	11.2	81	3.3
7	5.8	32	10.0	57	12.2	82	9.2
8	10.0	33	6.0	58	1.7	83	4.0
9	17.1	34	22.1	59	6.8	84	3.5
10	48.8	35	3.7	60	11.6	85	13.4
11	26.9	36	8.4	61	6.7	86	8.7
12	6.0	37	1.5	62	4.0	87	5.7
13	5.2	38	50.8	63	6.2	88	5.1
14	20.7	39	5.2	64	19.3	89	24.5
15	11.2	40	3.2	65	5.0	90	61.3
16	50.0	41	1.7	66	8.8	91	50.9
17	12.6	42	10.8	67	8.0	92	15.2
18	11.9	43	3.3	68	4.0	93	4.8
19	4.6	44	4.1	69	7.8	94	11.7
20	15.7	45	1.2	70	1.0	95	12.5
21	60.0	46	29.7	71	4.2	96	5.8
22	6.2	47	22.0	72	3.4	97	2.0
23	4.1	48	2.9	73	8.7	98	21.4
24	1.3	49	1.6	74	2.0	99	15.0
25	4.8	50	2.0	75	11.2	100	23.3

TABLE VIII

TABLE OF THE (M) VALUES OF THE

NO.	WAVELENGTH	NO.	WAVELENGTH	NO.	WAVELENGTH	NO.	WAVELENGTH
1	0.10	21	1.1	41	2.1	61	3.1
2	0.2	22	1.2	42	2.2	62	3.2
3	0.3	23	1.3	43	2.3	63	3.3
4	0.4	24	1.4	44	2.4	64	3.4
5	0.5	25	1.5	45	2.5	65	3.5
6	0.6	26	1.6	46	2.6	66	3.6
7	0.7	27	1.7	47	2.7	67	3.7
8	0.8	28	1.8	48	2.8	68	3.8
9	0.9	29	1.9	49	2.9	69	3.9
10	1.0	30	2.0	50	3.0	70	4.0
11	1.1	31	2.1	51	3.1	71	4.1
12	1.2	32	2.2	52	3.2	72	4.2
13	1.3	33	2.3	53	3.3	73	4.3
14	1.4	34	2.4	54	3.4	74	4.4
15	1.5	35	2.5	55	3.5	75	4.5
16	1.6	36	2.6	56	3.6	76	4.6
17	1.7	37	2.7	57	3.7	77	4.7
18	1.8	38	2.8	58	3.8	78	4.8
19	1.9	39	2.9	59	3.9	79	4.9
20	2.0	40	3.0	60	4.0	80	5.0
21	2.1	41	3.1	61	4.1	81	5.1
22	2.2	42	3.2	62	4.2	82	5.2
23	2.3	43	3.3	63	4.3	83	5.3
24	2.4	44	3.4	64	4.4	84	5.4
25	2.5	45	3.5	65	4.5	85	5.5
26	2.6	46	3.6	66	4.6	86	5.6
27	2.7	47	3.7	67	4.7	87	5.7
28	2.8	48	3.8	68	4.8	88	5.8
29	2.9	49	3.9	69	4.9	89	5.9
30	3.0	50	4.0	70	5.0	90	6.0
31	3.1	51	4.1	71	5.1	91	6.1
32	3.2	52	4.2	72	5.2	92	6.2
33	3.3	53	4.3	73	5.3	93	6.3
34	3.4	54	4.4	74	5.4	94	6.4
35	3.5	55	4.5	75	5.5	95	6.5
36	3.6	56	4.6	76	5.6	96	6.6
37	3.7	57	4.7	77	5.7	97	6.7
38	3.8	58	4.8	78	5.8	98	6.8
39	3.9	59	4.9	79	5.9	99	6.9
40	4.0	60	5.0	80	6.0	100	7.0

Table VIII

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 7

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	41.7	106	4.1	111	11.0	116	5.8
102	2.0	107	10.4	112	2.0	117	4.1
103	8.6	108	5.6	113	61.8	118	19.0
104	7.0	109	29.7	114	4.6	119	4.9
105	4.9	110	8.3	115	13.6	120	8.0

Table VIII

	Low Temperature		High Temperature		Total	
	Time (min)	Conc. (g/l)	Time (min)	Conc. (g/l)	Time (min)	Conc. (g/l)
1.0	10	0.1	10	0.1	20	0.2
2.0	10	0.1	10	0.1	20	0.2
3.0	10	0.1	10	0.1	20	0.2
4.0	10	0.1	10	0.1	20	0.2
5.0	10	0.1	10	0.1	20	0.2
6.0	10	0.1	10	0.1	20	0.2

Table IX

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 8

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	3.7	26	1.0	51	4.2	76	4.2
2	3.0	27	.5	52	4.7	77	1.8
3	1.7	28	1.7	53	1.1	78	1.1
4	6.2	29	6.4	54	2.0	79	5.0
5	28.0	30	2.5	55	23.0	80	2.0
6	10.0	31	4.1	56	12.9	81	4.2
7	1.0	32	1.8	57	11.0	82	3.0
8	1.2	33	20.0	58	10.0	83	5.4
9	2.3	34	22.0	59	10.3	84	2.7
10	4.7	35	1.0	60	5.0	85	11.0
11	21.9	36	41.0	61	3.9	86	37.7
12	2.3	37	2.6	62	.5	87	55.2
13	3.1	38	37.0	63	6.1	88	2.4
14	5.1	39	7.0	64	3.8	89	46.9
15	4.0	40	24.5	65	9.0	90	17.0
16	1.6	41	2.5	66	13.8	91	38.3
17	3.9	42	27.5	67	19.9	92	81.4
18	7.2	43	2.0	68	30.0	93	2.3
19	12.2	44	6.8	69	25.0	94	14.9
20	2.0	45	2.8	70	2.8	95	3.0
21	4.0	46	.8	71	72.2	96	3.0
22	13.1	47	15.7	72	7.0	97	2.7
23	2.3	48	4.8	73	6.0	98	60.0
24	.8	49	1.3	74	6.4	99	34.3
25	1.2	50	1.1	75	5.0	100	21.8

TABLE IX

TABLE IX. SUMMARY OF DATA FOR THE STUDY OF THE EFFECT OF TEMPERATURE ON THE RATE OF REACTION OF HYDROGEN PEROXIDE WITH POTASSIUM IODIDE

NO.	TEMPERATURE, °C.	INITIAL CONCENTRATION OF H ₂ O ₂ , M.	INITIAL CONCENTRATION OF KI, M.	INITIAL CONCENTRATION OF H ⁺ , M.	INITIAL CONCENTRATION OF I ⁻ , M.	INITIAL CONCENTRATION OF H ₂ O, M.
1	20.0	0.010	0.010	0.010	0.010	0.010
2	20.0	0.010	0.010	0.010	0.010	0.010
3	20.0	0.010	0.010	0.010	0.010	0.010
4	20.0	0.010	0.010	0.010	0.010	0.010
5	20.0	0.010	0.010	0.010	0.010	0.010
6	20.0	0.010	0.010	0.010	0.010	0.010
7	20.0	0.010	0.010	0.010	0.010	0.010
8	20.0	0.010	0.010	0.010	0.010	0.010
9	20.0	0.010	0.010	0.010	0.010	0.010
10	20.0	0.010	0.010	0.010	0.010	0.010
11	20.0	0.010	0.010	0.010	0.010	0.010
12	20.0	0.010	0.010	0.010	0.010	0.010
13	20.0	0.010	0.010	0.010	0.010	0.010
14	20.0	0.010	0.010	0.010	0.010	0.010
15	20.0	0.010	0.010	0.010	0.010	0.010
16	20.0	0.010	0.010	0.010	0.010	0.010
17	20.0	0.010	0.010	0.010	0.010	0.010
18	20.0	0.010	0.010	0.010	0.010	0.010
19	20.0	0.010	0.010	0.010	0.010	0.010
20	20.0	0.010	0.010	0.010	0.010	0.010
21	20.0	0.010	0.010	0.010	0.010	0.010
22	20.0	0.010	0.010	0.010	0.010	0.010
23	20.0	0.010	0.010	0.010	0.010	0.010
24	20.0	0.010	0.010	0.010	0.010	0.010
25	20.0	0.010	0.010	0.010	0.010	0.010

Table IX

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 8

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	20.1	126	8.0	151	7.1	176	16.0
102	6.6	127	14.0	152	10.2	177	.8
103	3.8	128	4.2	153	15.8	178	31.5
104	4.0	129	1.9	154	15.3	179	15.1
105	12.2	130	5.4	155	18.2	180	2.3
106	1.8	131	12.7	156	8.0	181	14.7
107	16.0	132	.8	157	3.1	182	8.0
108	13.2	133	5.2	158	2.1	183	17.5
109	12.0	134	1.1	159	1.8	184	3.0
110	4.5	135	1.6	160	29.4	185	3.7
111	6.0	136	5.9	161	2.4	186	18.8
112	2.8	137	5.8	162	2.6	187	9.0
113	1.5	138	13.2	163	42.1	188	2.3
114	13.0	139	6.0	164	16.9	189	1.0
115	16.6	140	5.9	165	2.3	190	4.0
116	5.0	141	39.0	166	22.8	191	.5
117	15.8	142	8.0	167	2.7	192	41.5
118	2.5	143	7.0	168	5.5	193	21.5
119	5.5	144	1.3	169	2.	194	7.2
120	39.2	145	1.1	170	2.0	195	13.0
121	15.0	146	28.3	171	3.5	196	6.5
122	5.9	147	1.1	172	4.0	197	2.8
123	20.5	148	.9	173	1.9	198	15.8
124	1.7	149	25.8	174	3.3	199	11.0
125	5.1	150	5.7	175	1.0	200	7.2

TABLE 1

TABLE 1. (mm) DISTANCE TO THE CENTER OF THE

NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE
101	1.05	101	1.05	101	1.05	101	1.05
102	1.05	102	1.05	102	1.05	102	1.05
103	1.05	103	1.05	103	1.05	103	1.05
104	1.05	104	1.05	104	1.05	104	1.05
105	1.05	105	1.05	105	1.05	105	1.05
106	1.05	106	1.05	106	1.05	106	1.05
107	1.05	107	1.05	107	1.05	107	1.05
108	1.05	108	1.05	108	1.05	108	1.05
109	1.05	109	1.05	109	1.05	109	1.05
110	1.05	110	1.05	110	1.05	110	1.05
111	1.05	111	1.05	111	1.05	111	1.05
112	1.05	112	1.05	112	1.05	112	1.05
113	1.05	113	1.05	113	1.05	113	1.05
114	1.05	114	1.05	114	1.05	114	1.05
115	1.05	115	1.05	115	1.05	115	1.05
116	1.05	116	1.05	116	1.05	116	1.05
117	1.05	117	1.05	117	1.05	117	1.05
118	1.05	118	1.05	118	1.05	118	1.05
119	1.05	119	1.05	119	1.05	119	1.05
120	1.05	120	1.05	120	1.05	120	1.05
121	1.05	121	1.05	121	1.05	121	1.05
122	1.05	122	1.05	122	1.05	122	1.05
123	1.05	123	1.05	123	1.05	123	1.05
124	1.05	124	1.05	124	1.05	124	1.05
125	1.05	125	1.05	125	1.05	125	1.05
126	1.05	126	1.05	126	1.05	126	1.05
127	1.05	127	1.05	127	1.05	127	1.05
128	1.05	128	1.05	128	1.05	128	1.05
129	1.05	129	1.05	129	1.05	129	1.05
130	1.05	130	1.05	130	1.05	130	1.05

Table IX

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 8

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
201	7.0	226	43.0	251	1.2	276	11.7
202	8.1	227	5.1	252	.7	277	4.0
203	47.8	228	15.3	253	1.1	278	18.7
204	1.3	229	2.2	254	17.5	279	2.0
205	2.2	230	1.1	255	1.9	280	11.7
206	1.0	231	5.1	256	.7	281	2.4
207	7.2	232	1.5	257	44.2	282	3.5
208	2.9	233	1.0	258	14.9	283	1.3
209	7.5	234	28.8	259	7.1	284	1.3
210	5.2	235	2.1	260	3.2	285	1.5
211	5.8	236	6.3	261	.8	286	1.0
212	1.7	237	1.3	262	5.0	287	2.4
213	3.5	238	2.2	263	5.6	288	1.5
214	10.8	239	2.1	264	4.8	289	1.1
215	14.2	240	3.3	265	6.0	290	11.6
216	1.0	241	8.5	266	10.1	291	1.7
217	6.9	242	1.2	267	1.5	292	6.2
218	17.5	243	32.7	268	3.7	293	3.0
219	1.0	244	3.7	269	1.3	294	1.4
220	1.8	245	3.0	270	2.0	295	5.1
221	2.0	246	.6	271	8.0	296	4.0
222	1.3	247	1.5	272	6.6	297	3.0
223	1.0	248	3.0	273	10.0	298	2.0
224	1.5	249	2.9	274	3.1	299	2.3
225	24.1	250	1.5	275	6.0	300	2.2

TABLE IX

THERMAL STABILITY OF POLYMERIZATION

TEMPERATURE	NO.	TIME	NO.	TEMPERATURE	NO.	TIME	NO.
11.1	101	1.0	102	11.1	103	1.0	104
11.1	105	1.0	106	11.1	107	1.0	108
11.1	109	1.0	110	11.1	111	1.0	112
11.1	113	1.0	114	11.1	115	1.0	116
11.1	117	1.0	118	11.1	119	1.0	120
11.1	121	1.0	122	11.1	123	1.0	124
11.1	125	1.0	126	11.1	127	1.0	128
11.1	129	1.0	130	11.1	131	1.0	132
11.1	133	1.0	134	11.1	135	1.0	136
11.1	137	1.0	138	11.1	139	1.0	140
11.1	141	1.0	142	11.1	143	1.0	144
11.1	145	1.0	146	11.1	147	1.0	148
11.1	149	1.0	150	11.1	151	1.0	152
11.1	153	1.0	154	11.1	155	1.0	156
11.1	157	1.0	158	11.1	159	1.0	160
11.1	161	1.0	162	11.1	163	1.0	164
11.1	165	1.0	166	11.1	167	1.0	168
11.1	169	1.0	170	11.1	171	1.0	172
11.1	173	1.0	174	11.1	175	1.0	176
11.1	177	1.0	178	11.1	179	1.0	180
11.1	181	1.0	182	11.1	183	1.0	184
11.1	185	1.0	186	11.1	187	1.0	188
11.1	189	1.0	190	11.1	191	1.0	192
11.1	193	1.0	194	11.1	195	1.0	196
11.1	197	1.0	198	11.1	199	1.0	200

Table IX

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 8

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
301	1.0	315	5.3	328	31.5	341	1.3
302	6.9	316	1.6	329	3.1	342	6.4
303	4.7	317	11.7	330	5.1	343	7.9
304	26.5	318	2.6	331	1.0	344	4.7
305	2.1	319	5.0	332	15.1	345	2.7
306	2.0	320	1.1	333	.8	346	2.0
307	1.0	321	11.9	334	3.1	347	27.8
308	2.4	322	.7	335	1.5	348	6.2
309	15.3	323	15.6	336	3.0	349	5.0
310	1.2	324	7.5	337	2.5	350	8.2
311	2.4	325	1.6	338	3.9	351	3.7
312	1.7	326	1.5	339	2.6	352	2.7
313	5.0	327	0.7	340	6.5	353	1.5
314	4.0						

II. Outline

FORM 1041 (2001) **Individual Taxpayer Statement**

[illegible]

Table X

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 9

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	12.4	26	2.5	51	1.1	76	7.1
2	4.0	27	4.6	52	14.0	77	6.8
3	6.9	28	2.3	53	14.9	78	11.2
4	1.2	29	1.9	54	1.0	79	3.1
5	2.5	30	22.9	55	3.9	80	2.1
6	5.5	31	7.4	56	1.1	81	7.3
7	7.3	32	3.5	57	1.2	82	4.2
8	2.3	33	2.4	58	4.0	83	1.4
9	1.2	34	11.6	59	9.4	84	3.9
10	.7	35	5.0	60	1.1	85	.5
11	4.5	36	1.9	61	2.8	86	24.5
12	10.8	37	5.6	62	4.0	87	2.9
13	3.2	38	9.7	63	3.2	88	28.0
14	2.3	39	20.0	64	7.4	89	1.6
15	6.2	40	2.7	65	2.0	90	3.1
16	10.0	41	1.5	66	6.5	91	2.7
17	4.9	42	1.7	67	3.7	92	3.1
18	3.1	43	1.8	68	1.7	93	9.0
19	3.3	44	1.0	69	.5	94	2.0
20	5.6	45	.9	70	1.3	95	3.1
21	3.9	46	9.9	71	9.4	96	10.2
22	3.8	47	10.2	72	4.8	97	2.1
23	4.0	48	6.7	73	4.1	98	1.6
24	1.2	49	14.0	74	14.7	99	1.2
25	4.0	50	37.8	75	2.8	100	2.1

Table X

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 9

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	3.4	126	10.8	151	4.9	175	1.0
102	2.5	127	6.3	152	2.8	176	6.2
103	11.6	128	1.4	153	3.4	177	2.5
104	5.9	129	1.1	154	35.0	178	4.1
105	1.1	130	3.3	155	4.0	179	5.2
106	12.2	131	3.4	156	1.4	180	2.4
107	2.7	132	12.9	157	13.0	181	11.4
108	3.0	133	3.0	158	3.3	182	1.7
109	1.9	134	1.9	159	7.2	183	2.0
110	17.9	135	2.3	160	7.5	184	.5
111	10.9	136	1.8	161	8.0	185	9.1
112	3.1	137	1.5	162	2.3	186	5.1
113	2.2	138	8.8	163	2.2	187	1.3
114	11.7	139	3.0	164	.6	188	1.0
115	6.5	140	1.2	165	2.4	189	.8
116	2.4	141	20.4	166	2.9	190	2.0
117	1.1	142	1.9	167	2.0	191	.5
118	21.7	143	17.7	168	2.3	192	1.1
119	1.4	144	3.0	169	1.3	193	6.9
120	1.3	145	16.9	170	2.0	194	2.5
121	2.2	146	2.6	171	3.8	195	1.2
122	.5	147	2.0	172	7.1	196	7.5
123	3.9	148	1.9	173	2.2	197	1.4
124	1.7	149	1.7	174	1.9	198	2.1
125	.6	150	2.8				

Table 1

TABLE 1. SUMMARY OF DATA FOR THE STUDY

NO.	STATION	NO.	STATION	NO.	STATION	NO.	STATION
101	101	102	102	103	103	104	104
105	105	106	106	107	107	108	108
109	109	110	110	111	111	112	112
113	113	114	114	115	115	116	116
117	117	118	118	119	119	120	120
121	121	122	122	123	123	124	124
125	125	126	126	127	127	128	128
131	131	132	132	133	133	134	134
135	135	136	136	137	137	138	138
141	141	142	142	143	143	144	144
145	145	146	146	147	147	148	148
151	151	152	152	153	153	154	154
155	155	156	156	157	157	158	158
161	161	162	162	163	163	164	164
165	165	166	166	167	167	168	168
171	171	172	172	173	173	174	174
175	175	176	176	177	177	178	178
181	181	182	182	183	183	184	184
185	185	186	186	187	187	188	188
191	191	192	192	193	193	194	194
195	195	196	196	197	197	198	198

Table XI

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 10

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	18.4	26	2.2	51	0.3	76	31.1
2	5.2	27	1.5	52	4.9	77	4.0
3	15.9	28	5.0	53	4.6	78	1.0
4	19.2	29	11.5	54	3.6	79	3.0
5	21.0	30	2.3	55	.6	80	13.6
6	12.1	31	0.0	56	3.0	81	2.0
7	2.2	32	1.9	57	3.9	82	7.5
8	3.9	33	3.6	58	1.1	83	63.9
9	8.0	34	2.5	59	3.3	84	6.3
10	1.3	35	1.4	60	1.1	85	3.0
11	2.7	36	4.0	61	3.1	86	6.8
12	31.2	37	3.8	62	5.2	87	5.7
13	20.2	38	2.0	63	1.1	88	3.0
14	4.0	39	.7	64	3.2	89	54.6
15	20.3	40	4.8	65	2.3	90	4.5
16	16.5	41	1.9	66	3.4	91	7.7
17	5.2	42	2.9	67	1.9	92	22.2
18	1.0	43	5.3	68	3.4	93	4.5
19	2.4	44	2.2	69	2.7	94	0.3
20	4.0	45	1.1	70	2.0	95	4.2
21	4.1	46	4.4	71	4.9	96	1.6
22	17.7	47	9.9	72	6.3	97	10.0
23	3.9	48	3.3	73	4.3	98	8.2
24	8.2	49	1.1	74	34.6	99	3.0
25	1.7	50	3.5	75	42.5	100	2.1

Table XI

TABLE CONTAINING DISTANCES (mm) FROM THE NO. 1

NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE
1	18.4	20	5.5	39	4.3	58	1.12
2	2.5	21	1.1	40	4.3	59	4.0
3	12.3	22	2.0	41	4.0	60	1.4
4	12.5	23	11.2	42	2.0	61	0.0
5	21.1	24	5.2	43	1.0	62	12.0
6	13.1	25	0.0	44	2.0	63	0.0
7	5.8	26	1.2	45	2.0	64	1.0
8	2.2	27	2.0	46	1.1	65	0.2
9	0.0	28	2.2	47	1.1	66	0.2
10	1.3	29	1.0	48	1.1	67	0.0
11	5.1	30	0.0	49	2.1	68	0.0
12	21.2	31	1.8	50	2.5	69	2.1
13	20.5	32	0.0	51	1.1	70	0.0
14	0.0	33	1.0	52	1.5	71	0.0
15	0.0	34	0.0	53	0.0	72	0.0
16	12.3	35	1.0	54	1.0	73	0.0
17	0.0	36	0.0	55	0.0	74	0.0
18	1.0	37	0.0	56	0.0	75	0.0
19	0.0	38	0.0	57	0.0	76	0.0
20	0.0	39	0.0	58	0.0	77	0.0
21	0.0	40	0.0	59	0.0	78	0.0
22	0.0	41	0.0	60	0.0	79	0.0
23	0.0	42	0.0	61	0.0	80	0.0
24	0.0	43	0.0	62	0.0	81	0.0
25	0.0	44	0.0	63	0.0	82	0.0
26	0.0	45	0.0	64	0.0	83	0.0
27	0.0	46	0.0	65	0.0	84	0.0
28	0.0	47	0.0	66	0.0	85	0.0
29	0.0	48	0.0	67	0.0	86	0.0
30	0.0	49	0.0	68	0.0	87	0.0
31	0.0	50	0.0	69	0.0	88	0.0
32	0.0	51	0.0	70	0.0	89	0.0
33	0.0	52	0.0	71	0.0	90	0.0
34	0.0	53	0.0	72	0.0	91	0.0
35	0.0	54	0.0	73	0.0	92	0.0
36	0.0	55	0.0	74	0.0	93	0.0
37	0.0	56	0.0	75	0.0	94	0.0
38	0.0	57	0.0	76	0.0	95	0.0
39	0.0	58	0.0	77	0.0	96	0.0
40	0.0	59	0.0	78	0.0	97	0.0
41	0.0	60	0.0	79	0.0	98	0.0
42	0.0	61	0.0	80	0.0	99	0.0
43	0.0	62	0.0	81	0.0	100	0.0
44	0.0	63	0.0	82	0.0	101	0.0
45	0.0	64	0.0	83	0.0	102	0.0
46	0.0	65	0.0	84	0.0	103	0.0
47	0.0	66	0.0	85	0.0	104	0.0
48	0.0	67	0.0	86	0.0	105	0.0
49	0.0	68	0.0	87	0.0	106	0.0
50	0.0	69	0.0	88	0.0	107	0.0
51	0.0	70	0.0	89	0.0	108	0.0
52	0.0	71	0.0	90	0.0	109	0.0
53	0.0	72	0.0	91	0.0	110	0.0
54	0.0	73	0.0	92	0.0	111	0.0
55	0.0	74	0.0	93	0.0	112	0.0
56	0.0	75	0.0	94	0.0	113	0.0
57	0.0	76	0.0	95	0.0	114	0.0
58	0.0	77	0.0	96	0.0	115	0.0
59	0.0	78	0.0	97	0.0	116	0.0
60	0.0	79	0.0	98	0.0	117	0.0
61	0.0	80	0.0	99	0.0	118	0.0
62	0.0	81	0.0	100	0.0	119	0.0
63	0.0	82	0.0	101	0.0	120	0.0
64	0.0	83	0.0	102	0.0	121	0.0
65	0.0	84	0.0	103	0.0	122	0.0
66	0.0	85	0.0	104	0.0	123	0.0
67	0.0	86	0.0	105	0.0	124	0.0
68	0.0	87	0.0	106	0.0	125	0.0
69	0.0	88	0.0	107	0.0	126	0.0
70	0.0	89	0.0	108	0.0	127	0.0
71	0.0	90	0.0	109	0.0	128	0.0
72	0.0	91	0.0	110	0.0	129	0.0
73	0.0	92	0.0	111	0.0	130	0.0
74	0.0	93	0.0	112	0.0	131	0.0
75	0.0	94	0.0	113	0.0	132	0.0
76	0.0	95	0.0	114	0.0	133	0.0
77	0.0	96	0.0	115	0.0	134	0.0
78	0.0	97	0.0	116	0.0	135	0.0
79	0.0	98	0.0	117	0.0	136	0.0
80	0.0	99	0.0	118	0.0	137	0.0
81	0.0	100	0.0	119	0.0	138	0.0
82	0.0	101	0.0	120	0.0	139	0.0
83	0.0	102	0.0	121	0.0	140	0.0
84	0.0	103	0.0	122	0.0	141	0.0
85	0.0	104	0.0	123	0.0	142	0.0
86	0.0	105	0.0	124	0.0	143	0.0
87	0.0	106	0.0	125	0.0	144	0.0
88	0.0	107	0.0	126	0.0	145	0.0
89	0.0	108	0.0	127	0.0	146	0.0
90	0.0	109	0.0	128	0.0	147	0.0
91	0.0	110	0.0	129	0.0	148	0.0
92	0.0	111	0.0	130	0.0	149	0.0
93	0.0	112	0.0	131	0.0	150	0.0
94	0.0	113	0.0	132	0.0	151	0.0
95	0.0	114	0.0	133	0.0	152	0.0
96	0.0	115	0.0	134	0.0	153	0.0
97	0.0	116	0.0	135	0.0	154	0.0
98	0.0	117	0.0	136	0.0	155	0.0
99	0.0	118	0.0	137	0.0	156	0.0
100	0.0	119	0.0	138	0.0	157	0.0
101	0.0	120	0.0	139	0.0	158	0.0
102	0.0	121	0.0	140	0.0	159	0.0
103	0.0	122	0.0	141	0.0	160	0.0
104	0.0	123	0.0	142	0.0	161	0.0
105	0.0	124	0.0	143	0.0	162	0.0
106	0.0	125	0.0	144	0.0	163	0.0
107	0.0	126	0.0	145	0.0	164	0.0
108	0.0	127	0.0	146	0.0	165	0.0
109	0.0	128	0.0	147	0.0	166	0.0
110	0.0	129	0.0	148	0.0	167	0.0
111	0.0	130	0.0	149	0.0	168	0.0
112	0.0	131	0.0	150	0.0	169	0.0
113	0.0	132	0.0	151	0.0	170	0.0
114	0.0	133	0.0	152	0.0	171	0.0
115	0.0	134	0.0	153	0.0	172	0.0
116	0.0	135	0.0	154	0.0	173	0.0
117	0.0	136	0.0	155	0.0	174	0.0
118	0.0	137	0.0	156	0.0	175	0.0
119	0.0	138	0.0	157	0.0	176	0.0
120	0.0	139	0.0	158	0.0	177	0.0
121	0.0	140	0.0	159	0.0	178	0.0
122	0.0	141	0.0	160	0.0	179	0.0
123	0.0	142	0.0	161	0.0	180	0.0
124	0.0	143	0.0	162	0.0	181	0.0
125	0.0	144	0.0	163	0.0	182	0.0
126	0.0	145	0.0	164	0.0	183	0.0
127	0.0	146	0.0	165	0.0	184	0.0
128	0.0	147	0.0	166	0.0	185	0.0
129	0.0	148	0.0	167	0.0	186	0.0
130	0.0	149	0.0	168	0.0	187	0.0
131	0.0	150	0.0	169	0.0	188	0.0
132	0.0	151	0.0	170	0.0	189	0.0
133	0.0	152	0.0	171	0.0	190	0.0
134	0.0	153	0.0	172	0.0	191	0.0
135	0.0	154	0.0	173	0.0	192	0.0
136	0.0	155	0.0	174	0.0	193	0.0
137	0.0	156	0.0	175	0.0	194	0.0
138	0.0	157	0.0	176	0.0	195	0.0
139	0.0	158	0.0	177	0.0	196	0.0
140	0.0	159	0.0	178	0.0	197	0.0
141	0.0	160	0.0	179	0.0	198	0.0
142	0.0	161	0.0	180	0.0	199	0.0
143	0.0	162	0.0	181	0.0	200	0.0
144	0.0	163	0.0	182	0.0	201	0.0
145	0.0	164	0.0	183	0.0	202	0.0
146	0.0	165	0.0	184	0.0	203	0.0
147	0.0	166	0.0	185	0.0	204	0.0
148	0.0	167	0.0	186	0.0	205	0.0
149	0.0	168	0.0	187	0.0	206	0.0
150	0.0	169	0.0	188	0.0	207	0.0
151	0.0	170	0.0	189	0.0	208	0.0
152	0.0	171	0.0	190	0.0	209	0.0
153	0.0	172	0.0	191	0.0	210	0.0
154	0.0	173	0.0	192	0.0	211	0.0
155	0.0	174	0.0	193	0.0	212	0.0
156	0.0	175	0.0	194	0.0	213	0.0
157	0.0	176	0.0	195	0.0	214	0.0
158	0.0	177	0.0	196	0.0	215	0.0
159	0.0	178	0.0	197	0.0	216	0.0
160	0.0	179	0.0	198	0.0	217	0.0
161	0.0	180	0.0	199	0.0	218	0.0
162	0.0	181	0.0	200	0.0	219	0.0
163	0.0	182	0.0	201	0.0	220	0.0
164	0.0	183	0.0	202	0.0	221	0.0
165	0.0	184	0.0	203	0.0	222	0.0
166	0.0	185	0.0	204	0.0	223	0.0
167	0.0	186	0.0	205	0.0	224	0.0
168	0.0	187	0.0	206	0.0	225	0.0
169	0.0	188	0.0	207	0.0	226	0.0
170	0.0	189	0.0	208	0.0	227	0.0
171	0.0	190	0.0	209	0.0	228	0.0
172	0.0	191	0.0	210	0.0	229	0.0
173	0.0	192	0.0	211	0.0	230	0.0
174	0.0	193	0.0	212	0.0	231	0.0
175	0.0	194	0.0	213	0.0	232	0.0
176	0.0	195	0.0	214	0.0	233	0.0
177	0.0	196	0.0	215	0.0	234	0.0
178	0.0	197	0.0	216	0.0	235	

Table XI

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 10

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	1.3	126	3.9	151	5.1	176	3.3
102	10.0	127	19.4	152	5.0	177	2.0
103	4.4	128	37.0	153	5.0	178	2.2
104	7.6	129	.5	154	.9	179	2.9
105	3.6	130	3.0	155	2.6	180	2.5
106	11.7	131	6.6	156	2.2	181	2.6
107	15.9	132	1.5	157	3.9	182	2.7
108	2.8	133	3.6	158	9.4	183	2.1
109	6.5	134	7.0	159	1.9	184	2.0
110	.8	135	3.2	160	3.6	185	2.0
111	3.4	136	3.2	161	1.2	186	12.0
112	20.0	137	1.3	162	1.8	187	2.3
113	3.5	138	2.9	163	8.0	188	1.3
114	6.0	139	4.1	164	2.6	189	1.8
115	12.0	140	3.9	165	.8	190	3.8
116	3.6	141	5.3	166	3.8	191	8.8
117	9.9	142	8.0	167	2.0	192	7.6
118	4.4	143	5.8	168	1.7	193	16.4
119	4.3	144	4.5	169	2.2	194	4.4
120	3.8	145	5.3	170	1.7	195	1.5
121	2.9	146	6.8	171	2.3	196	12.6
122	20.0	147	2.0	172	7.0	197	1.5
123	4.0	148	2.5	173	3.4	198	1.6
124	4.1	149	7.3	174	1.3	199	1.2
125	16.5	150	1.7	175	1.6	200	1.2

TABLE 1

TABLE COMPARISON OF DISTANCES (MILES) FOR EACH OF THE

NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE
101	1.1	150	2.2	101	1.1	150	2.2
102	10.0	151	13.4	102	10.0	151	13.4
103	4.4	152	21.0	103	4.4	152	21.0
104	1.0	153	2.0	104	1.0	153	2.0
105	2.0	154	2.0	105	2.0	154	2.0
106	11.1	155	1.0	106	11.1	155	1.0
107	10.0	156	1.0	107	10.0	156	1.0
108	2.0	157	2.0	108	2.0	157	2.0
109	0.0	158	1.0	109	0.0	158	1.0
110	0.0	159	2.0	110	0.0	159	2.0
111	2.0	160	2.0	111	2.0	160	2.0
112	50.0	161	1.0	112	50.0	161	1.0
113	2.0	162	2.0	113	2.0	162	2.0
114	0.0	163	1.0	114	0.0	163	1.0
115	18.0	164	2.0	115	18.0	164	2.0
116	2.0	165	2.0	116	2.0	165	2.0
117	0.0	166	2.0	117	0.0	166	2.0
118	2.0	167	2.0	118	2.0	167	2.0
119	2.0	168	2.0	119	2.0	168	2.0
120	4.4	169	2.0	120	4.4	169	2.0
121	2.0	170	2.0	121	2.0	170	2.0
122	10.0	171	2.0	122	10.0	171	2.0
123	2.0	172	2.0	123	2.0	172	2.0
124	4.0	173	2.0	124	4.0	173	2.0
125	2.0	174	2.0	125	2.0	174	2.0
126	2.0	175	2.0	126	2.0	175	2.0
127	2.0	176	2.0	127	2.0	176	2.0
128	1.1	177	2.0	128	1.1	177	2.0
129	10.0	178	2.0	129	10.0	178	2.0
130	2.0	179	2.0	130	2.0	179	2.0
131	2.0	180	2.0	131	2.0	180	2.0
132	2.0	181	2.0	132	2.0	181	2.0
133	2.0	182	2.0	133	2.0	182	2.0
134	2.0	183	2.0	134	2.0	183	2.0
135	2.0	184	2.0	135	2.0	184	2.0
136	2.0	185	2.0	136	2.0	185	2.0
137	2.0	186	2.0	137	2.0	186	2.0
138	2.0	187	2.0	138	2.0	187	2.0
139	2.0	188	2.0	139	2.0	188	2.0
140	2.0	189	2.0	140	2.0	189	2.0
141	2.0	190	2.0	141	2.0	190	2.0
142	2.0	191	2.0	142	2.0	191	2.0
143	2.0	192	2.0	143	2.0	192	2.0
144	2.0	193	2.0	144	2.0	193	2.0
145	2.0	194	2.0	145	2.0	194	2.0
146	2.0	195	2.0	146	2.0	195	2.0
147	2.0	196	2.0	147	2.0	196	2.0
148	2.0	197	2.0	148	2.0	197	2.0
149	2.0	198	2.0	149	2.0	198	2.0
150	2.0	199	2.0	150	2.0	199	2.0

Table XI

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 10

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
201	1.5	210	1.3	219	1.6	228	3.5
202	2.1	211	2.6	220	3.1	229	6.6
203	1.7	212	1.9	221	4.7	230	3.5
204	2.0	213	1.3	222	2.4	231	2.0
205	5.3	214	1.7	223	3.9	232	11.5
206	12.0	215	2.0	224	.7	233	1.9
207	3.6	216	6.1	225	3.3	234	3.2
208	1.6	217	5.7	226	4.9	235	1.9
209	5.1	218	2.7	227	9.0	236	.7

Table XII

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 11

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	1.7	26	1.9	51	11.7	76	4.4
2	1.3	27	2.0	52	2.0	77	2.7
3	5.0	28	1.8	53	7.8	78	4.6
4	1.9	29	2.3	54	2.9	79	1.9
5	6.9	30	1.8	55	50.7	80	2.0
6	2.7	31	2.2	56	1.6	81	6.2
7	3.3	32	1.5	57	1.3	82	6.1
8	1.7	33	3.2	58	2.0	83	1.5
9	4.5	34	3.5	59	7.5	84	3.1
10	6.3	35	1.6	60	1.1	85	5.5
11	1.6	36	1.4	61	14.7	86	1.9
12	2.0	37	17.1	62	3.0	87	.8
13	1.3	38	1.4	63	2.8	88	4.1
14	6.6	39	2.0	64	1.6	89	1.0
15	.7	40	1.5	65	9.3	90	6.3
16	1.3	41	1.5	66	1.9	91	10.0
17	2.3	42	2.0	67	1.6	92	1.5
18	7.1	43	3.3	68	2.9	93	3.8
19	1.0	44	4.3	69	.9	94	3.4
20	3.6	45	2.4	70	10.0	95	1.7
21	10.3	46	6.0	71	2.0	96	1.6
22	3.4	47	3.0	72	1.3	97	1.7
23	2.9	48	2.0	73	1.6	98	7.7
24	1.8	49	9.7	74	1.6	99	7.4
25	2.1	50	2.0	75	16.0	100	1.2

Table 11

TABLE 11. COMPARISON OF MEAN (mm) OF THE TWO GROUPS

STATION	NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE	NO.
1	20	1.1	21	1.2	22	1.1	23
2	24	1.3	25	1.0	26	1.0	27
3	28	2.0	29	1.8	30	1.8	31
4	32	1.9	33	1.3	34	1.3	35
5	36	0.9	37	1.8	38	2.0	39
6	40	1.1	41	1.0	42	1.0	43
7	44	2.3	45	1.2	46	1.3	47
8	48	1.1	49	2.5	50	1.0	51
9	52	4.2	53	2.0	54	1.2	55
10	56	0.9	57	1.0	58	1.1	59
11	60	1.0	61	1.4	62	1.4	63
12	64	1.0	65	1.1	66	1.0	67
13	68	1.3	69	1.4	70	1.0	71
14	72	0.0	73	1.0	74	1.0	75
15	76	1.0	77	1.0	78	1.0	79
16	80	1.0	81	1.0	82	1.0	83
17	84	1.0	85	1.0	86	1.0	87
18	88	1.0	89	1.0	90	1.0	91
19	92	1.0	93	1.0	94	1.0	95
20	96	1.0	97	1.0	98	1.0	99
21	100	1.0	101	1.0	102	1.0	103
22	104	1.0	105	1.0	106	1.0	107
23	108	1.0	109	1.0	110	1.0	111
24	112	1.0	113	1.0	114	1.0	115
25	116	1.0	117	1.0	118	1.0	119
26	120	1.0	121	1.0	122	1.0	123
27	124	1.0	125	1.0	126	1.0	127
28	128	1.0	129	1.0	130	1.0	131
29	132	1.0	133	1.0	134	1.0	135
30	136	1.0	137	1.0	138	1.0	139
31	140	1.0	141	1.0	142	1.0	143
32	144	1.0	145	1.0	146	1.0	147
33	148	1.0	149	1.0	150	1.0	151
34	152	1.0	153	1.0	154	1.0	155
35	156	1.0	157	1.0	158	1.0	159
36	160	1.0	161	1.0	162	1.0	163
37	164	1.0	165	1.0	166	1.0	167
38	168	1.0	169	1.0	170	1.0	171
39	172	1.0	173	1.0	174	1.0	175
40	176	1.0	177	1.0	178	1.0	179
41	180	1.0	181	1.0	182	1.0	183
42	184	1.0	185	1.0	186	1.0	187
43	188	1.0	189	1.0	190	1.0	191
44	192	1.0	193	1.0	194	1.0	195
45	196	1.0	197	1.0	198	1.0	199
46	200	1.0	201	1.0	202	1.0	203

Table XII

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 11

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	11.0	126	6.0	151	1.5	176	1.5
102	1.7	127	3.0	152	1.0	177	3.2
103	9.8	128	13.0	153	11.5	178	1.8
104	5.2	129	1.5	154	1.2	179	14.9
105	.8	130	1.3	155	6.8	180	1.1
106	2.0	131	1.7	156	27.8	181	4.0
107	3.4	132	4.8	157	1.5	182	6.5
108	2.4	133	1.1	158	46.5	183	1.1
109	3.8	134	5.0	159	1.5	184	5.0
110	1.0	135	2.5	160	4.2	185	7.5
111	2.0	136	5.5	161	5.4	186	3.0
112	2.7	137	2.0	162	3.5	187	1.3
113	2.0	138	14.5	163	20.8	188	46.5
114	16.7	139	15.2	164	4.6	189	1.9
115	5.4	140	1.8	165	5.1	190	2.0
116	37.0	141	1.2	166	1.2	191	1.8
117	2.7	142	7.0	167	1.1	192	8.0
118	1.7	143	3.0	168	1.7	193	7.2
119	10.0	144	1.2	169	1.9	194	1.2
120	7.4	145	30.1	170	8.0	195	2.0
121	33.3	146	2.0	171	1.8	196	1.0
122	45.3	147	50.0	172	5.9	197	1.8
123	8.7	148	2.2	173	7.0	198	3.5
124	1.1	149	1.2	174	1.0	199	1.1
125	3.9	150	2.7	175	2.8	200	1.2

11. 9/16/82

LC # 99-0678 (S&P) submitted: 11/27/00 BY: [redacted]

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Table XIII

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 12

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	2.3	26	19.0	51	6.7	76	2.8
2	2.6	27	8.2	52	1.1	77	3.7
3	1.5	28	5.6	53	1.8	78	.8
4	1.5	29	10.0	54	2.0	79	15.0
5	2.0	30	5.0	55	2.7	80	7.3
6	1.8	31	1.8	56	4.1	81	2.8
7	1.1	32	1.0	57	3.0	82	2.3
8	3.7	33	2.0	58	5.0	83	3.4
9	0.0	34	6.7	59	1.0	84	2.4
10	5.0	35	1.8	60	8.6	85	14.0
11	7.9	36	5.1	61	2.0	86	6.3
12	1.0	37	2.4	62	5.0	87	2.7
13	6.4	38	3.0	63	2.5	88	5.2
14	1.0	39	1.4	64	4.2	89	3.5
15	2.7	40	1.4	65	6.4	90	2.8
16	4.0	41	2.5	66	2.2	91	7.0
17	2.3	42	2.0	67	4.9	92	8.6
18	4.9	43	1.0	68	3.6	93	1.5
19	4.0	44	5.0	69	4.1	94	2.6
20	2.5	45	1.4	70	4.0	95	2.2
21	.5	46	2.3	71	10.1	96	2.1
22	1.2	47	1.4	72	4.0	97	2.2
23	8.2	48	2.0	73	6.2	98	5.1
24	5.1	49	4.7	74	2.9	99	2.0
25	3.1	50	4.4	75	5.3	100	2.4

TABLE 111

TABLE OF CORRELATION COEFFICIENTS (R) FOR THE MONTHS

NO.	MONTH	DISTANCE	NO.	MONTH	DISTANCE	NO.	MONTH
1	Jan	0.01	21	Jan	0.01	41	Jan
2	Feb	0.01	22	Feb	0.01	42	Feb
3	Mar	0.01	23	Mar	0.01	43	Mar
4	Apr	0.01	24	Apr	0.01	44	Apr
5	May	0.01	25	May	0.01	45	May
6	Jun	0.01	26	Jun	0.01	46	Jun
7	Jul	0.01	27	Jul	0.01	47	Jul
8	Aug	0.01	28	Aug	0.01	48	Aug
9	Sep	0.01	29	Sep	0.01	49	Sep
10	Oct	0.01	30	Oct	0.01	50	Oct
11	Nov	0.01	31	Nov	0.01	51	Nov
12	Dec	0.01	32	Dec	0.01	52	Dec
13	Jan	0.01	33	Jan	0.01	53	Jan
14	Feb	0.01	34	Feb	0.01	54	Feb
15	Mar	0.01	35	Mar	0.01	55	Mar
16	Apr	0.01	36	Apr	0.01	56	Apr
17	May	0.01	37	May	0.01	57	May
18	Jun	0.01	38	Jun	0.01	58	Jun
19	Jul	0.01	39	Jul	0.01	59	Jul
20	Aug	0.01	40	Aug	0.01	60	Aug
21	Sep	0.01	41	Sep	0.01	61	Sep
22	Oct	0.01	42	Oct	0.01	62	Oct
23	Nov	0.01	43	Nov	0.01	63	Nov
24	Dec	0.01	44	Dec	0.01	64	Dec
25	Jan	0.01	45	Jan	0.01	65	Jan
26	Feb	0.01	46	Feb	0.01	66	Feb
27	Mar	0.01	47	Mar	0.01	67	Mar
28	Apr	0.01	48	Apr	0.01	68	Apr
29	May	0.01	49	May	0.01	69	May
30	Jun	0.01	50	Jun	0.01	70	Jun
31	Jul	0.01	51	Jul	0.01	71	Jul
32	Aug	0.01	52	Aug	0.01	72	Aug
33	Sep	0.01	53	Sep	0.01	73	Sep
34	Oct	0.01	54	Oct	0.01	74	Oct
35	Nov	0.01	55	Nov	0.01	75	Nov
36	Dec	0.01	56	Dec	0.01	76	Dec
37	Jan	0.01	57	Jan	0.01	77	Jan
38	Feb	0.01	58	Feb	0.01	78	Feb
39	Mar	0.01	59	Mar	0.01	79	Mar
40	Apr	0.01	60	Apr	0.01	80	Apr
41	May	0.01	61	May	0.01	81	May
42	Jun	0.01	62	Jun	0.01	82	Jun
43	Jul	0.01	63	Jul	0.01	83	Jul
44	Aug	0.01	64	Aug	0.01	84	Aug
45	Sep	0.01	65	Sep	0.01	85	Sep
46	Oct	0.01	66	Oct	0.01	86	Oct
47	Nov	0.01	67	Nov	0.01	87	Nov
48	Dec	0.01	68	Dec	0.01	88	Dec
49	Jan	0.01	69	Jan	0.01	89	Jan
50	Feb	0.01	70	Feb	0.01	90	Feb
51	Mar	0.01	71	Mar	0.01	91	Mar
52	Apr	0.01	72	Apr	0.01	92	Apr
53	May	0.01	73	May	0.01	93	May
54	Jun	0.01	74	Jun	0.01	94	Jun
55	Jul	0.01	75	Jul	0.01	95	Jul
56	Aug	0.01	76	Aug	0.01	96	Aug
57	Sep	0.01	77	Sep	0.01	97	Sep
58	Oct	0.01	78	Oct	0.01	98	Oct
59	Nov	0.01	79	Nov	0.01	99	Nov
60	Dec	0.01	80	Dec	0.01	100	Dec

Table XIII

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 12

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	21.0	110	1.6	119	13.6	128	3.6
102	2.1	111	3.0	120	1.4	129	1.5
103	4.0	112	4.7	121	2.1	130	3.2
104	1.3	113	5.1	122	2.8	131	2.4
105	2.0	114	3.2	123	3.2	132	21.4
106	8.5	115	2.7	124	1.7	133	5.8
107	18.8	116	1.7	125	18.6	134	3.3
108	4.9	117	2.8	126	17.0	135	2.1
109	1.6	118	8.2	127	1.8		

TABLE III

TABLE III. (continued) (mm) (mm) (mm) (mm) (mm) (mm) (mm) (mm)

NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6	NO. 7	NO. 8
101	101	101	101	101	101	101	101
102	102	102	102	102	102	102	102
103	103	103	103	103	103	103	103
104	104	104	104	104	104	104	104
105	105	105	105	105	105	105	105
106	106	106	106	106	106	106	106
107	107	107	107	107	107	107	107
108	108	108	108	108	108	108	108
109	109	109	109	109	109	109	109
110	110	110	110	110	110	110	110

Table XIV

TAPE CONTACT DISTANCES (mm) FOR TAPE NO. 13

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	26.7	26	13.2	51	1.3	76	7.1
2	34.6	27	9.7	52	4.2	77	4.4
3	10.5	28	4.9	53	2.5	78	1.9
4	4.9	29	2.7	54	1.5	79	2.1
5	1.5	30	3.6	55	1.4	80	5.0
6	5.8	31	3.9	56	5.7	81	2.5
7	5.8	32	6.8	57	5.1	82	3.8
8	5.0	33	25.0	58	11.8	83	11.7
9	2.1	34	.9	59	2.7	84	1.7
10	2.1	35	6.1	60	5.1	85	2.1
11	8.2	36	2.4	61	3.6	86	10.5
12	3.9	37	8.5	62	2.2	87	1.2
13	2.2	38	1.5	63	3.0	88	1.9
14	5.5	39	4.3	64	1.1	89	5.0
15	1.6	40	2.1	65	4.0	90	2.8
16	2.0	41	7.3	66	2.4	91	3.0
17	18.3	42	4.2	67	14.0	92	2.4
18	4.5	43	6.3	68	3.4	93	1.7
19	32.6	44	17.2	69	4.4	94	5.5
20	3.8	45	3.4	70	8.0	95	3.1
21	12.1	46	10.4	71	2.1	96	3.0
22	3.0	47	3.8	72	3.7	97	.8
23	3.2	48	3.2	73	2.4	98	4.0
24	2.0	49	2.0	74	2.0	99	1.7
25	2.0	50	2.2	75	17.0	100	1.7

VIA older

TABLE 1. DISTANCE (mm) FROM THE

STATION	NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE	NO.
1	1	50.1	25	13.5	21	1.2	15
2	2	24.2	26	2.5	22	4.5	16
3	3	10.2	28	4.2	23	2.5	17
4	4	4.2	30	2.5	24	1.2	18
5	5	1.2	32	2.2	25	1.4	19
6	6	2.2	34	2.2	26	2.5	20
7	7	2.2	36	2.2	27	2.1	21
8	8	2.0	38	2.25	28	11.2	22
9	9	5.1	40	2	29	5.5	23
10	10	5.1	42	2.1	30	2.1	24
11	11	2.5	44	2.2	31	2.2	25
12	12	2.2	46	2.2	32	2.5	26
13	13	2.2	48	1.2	33	2.2	27
14	14	2.2	50	4.2	34	1.1	28
15	15	1.2	52	5.1	35	4.2	29
16	16	5.2	54	2.2	36	2.2	30
17	17	2.2	56	2.2	37	2.2	31
18	18	2.2	58	2.2	38	2.2	32
19	19	2.2	60	2.2	39	2.2	33
20	20	2.2	62	2.2	40	2.2	34
21	21	2.2	64	2.2	41	2.2	35
22	22	2.2	66	2.2	42	2.2	36
23	23	2.2	68	2.2	43	2.2	37
24	24	2.2	70	2.2	44	2.2	38
25	25	2.2	72	2.2	45	2.2	39
26	26	2.2	74	2.2	46	2.2	40
27	27	2.2	76	2.2	47	2.2	41
28	28	2.2	78	2.2	48	2.2	42
29	29	2.2	80	2.2	49	2.2	43
30	30	2.2	82	2.2	50	2.2	44
31	31	2.2	84	2.2	51	2.2	45
32	32	2.2	86	2.2	52	2.2	46
33	33	2.2	88	2.2	53	2.2	47
34	34	2.2	90	2.2	54	2.2	48
35	35	2.2	92	2.2	55	2.2	49
36	36	2.2	94	2.2	56	2.2	50
37	37	2.2	96	2.2	57	2.2	51
38	38	2.2	98	2.2	58	2.2	52
39	39	2.2	100	2.2	59	2.2	53
40	40	2.2	102	2.2	60	2.2	54
41	41	2.2	104	2.2	61	2.2	55
42	42	2.2	106	2.2	62	2.2	56
43	43	2.2	108	2.2	63	2.2	57
44	44	2.2	110	2.2	64	2.2	58
45	45	2.2	112	2.2	65	2.2	59
46	46	2.2	114	2.2	66	2.2	60
47	47	2.2	116	2.2	67	2.2	61
48	48	2.2	118	2.2	68	2.2	62
49	49	2.2	120	2.2	69	2.2	63
50	50	2.2	122	2.2	70	2.2	64

Table XIV

TABLE CONTACT DISTANCES (mm) FOR TAP No. 13

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	3.7	118	4.0	134	16.8	150	1.2
102	1.1	119	8.3	135	4.9	151	2.1
103	8.8	120	2.0	136	16.3	152	5.7
104	11.7	121	9.7	137	2.9	153	1.3
105	3.8	122	2.8	138	8.7	154	6.8
106	12.9	123	3.5	139	2.7	155	2.6
107	1.7	124	2.0	140	2.0	156	2.1
108	3.3	125	3.2	141	1.4	157	1.7
109	2.8	126	5.8	142	2.7	158	2.5
110	2.4	127	1.8	143	1.0	159	5.4
111	1.0	128	2.6	144	4.2	160	.9
112	.6	129	5.0	145	4.9	161	3.8
113	4.7	130	5.2	146	7.3	162	2.0
114	2.2	131	15.0	147	7.3	163	1.0
115	0.0	132	6.8	148	1.4	164	3.6
116	13.5	133	1.2	149	2.8	165	1.2
117	13.5						

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NO.	DATE	NO.	DATE	NO.	DATE	NO.	DATE
101	1.1	101	1.1	101	1.1	101	1.1
102	1.2	102	1.2	102	1.2	102	1.2
103	1.3	103	1.3	103	1.3	103	1.3
104	1.4	104	1.4	104	1.4	104	1.4
105	1.5	105	1.5	105	1.5	105	1.5
106	1.6	106	1.6	106	1.6	106	1.6
107	1.7	107	1.7	107	1.7	107	1.7
108	1.8	108	1.8	108	1.8	108	1.8
109	1.9	109	1.9	109	1.9	109	1.9
110	1.10	110	1.10	110	1.10	110	1.10
111	1.11	111	1.11	111	1.11	111	1.11
112	1.12	112	1.12	112	1.12	112	1.12
113	1.13	113	1.13	113	1.13	113	1.13
114	1.14	114	1.14	114	1.14	114	1.14
115	1.15	115	1.15	115	1.15	115	1.15
116	1.16	116	1.16	116	1.16	116	1.16
117	1.17	117	1.17	117	1.17	117	1.17
118	1.18	118	1.18	118	1.18	118	1.18
119	1.19	119	1.19	119	1.19	119	1.19
120	1.20	120	1.20	120	1.20	120	1.20

Table XV

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 14

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	2.2	26	12.9	51	3.0	76	22.3
2	4.6	27	57.3	52	3.4	77	30.0
3	5.0	28	18.0	53	18.0	78	3.9
4	14.8	29	7.3	54	1.4	79	4.0
5	9.2	30	13.8	55	8.0	80	4.9
6	7.6	31	4.8	56	2.7	81	13.2
7	1.8	32	2.9	57	7.3	82	8.5
8	1.9	33	7.0	58	1.2	83	15.4
9	15.0	34	2.0	59	3.9	84	4.0
10	6.9	35	1.8	60	5.2	85	1.8
11	4.7	36	4.8	61	7.2	86	7.7
12	3.0	37	3.9	62	8.4	87	6.7
13	.7	38	1.8	63	5.1	88	7.0
14	3.1	39	3.6	64	16.3	89	1.0
15	7.4	40	3.9	65	22.9	90	11.5
16	15.5	41	1.3	66	37.4	91	6.9
17	2.9	42	10.0	67	5.1	92	7.0
18	15.7	43	35.7	68	4.5	93	6.4
19	9.2	44	4.2	69	2.9	94	8.0
20	5.0	45	3.1	70	8.8	95	8.0
21	27.0	46	4.1	71	2.0	96	1.6
22	15.8	47	3.3	72	11.2	97	2.1
23	42.0	48	3.5	73	8.9	98	12.1
24	3.0	49	8.0	74	6.3	99	2.5
25	10.0	50	3.8	75	7.0	100	7.0

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NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE
1	3.5	21	3.0	41	15.2	61	3.5
2	4.0	22	3.4	42	15.7	62	4.0
3	4.5	23	3.8	43	16.2	63	4.5
4	5.0	24	4.2	44	16.7	64	5.0
5	5.5	25	4.6	45	17.2	65	5.5
6	6.0	26	5.0	46	17.7	66	6.0
7	6.5	27	5.4	47	18.2	67	6.5
8	7.0	28	5.8	48	18.7	68	7.0
9	7.5	29	6.2	49	19.2	69	7.5
10	8.0	30	6.6	50	19.7	70	8.0
11	8.5	31	7.0	51	20.2	71	8.5
12	9.0	32	7.4	52	20.7	72	9.0
13	9.5	33	7.8	53	21.2	73	9.5
14	10.0	34	8.2	54	21.7	74	10.0
15	10.5	35	8.6	55	22.2	75	10.5
16	11.0	36	9.0	56	22.7	76	11.0
17	11.5	37	9.4	57	23.2	77	11.5
18	12.0	38	9.8	58	23.7	78	12.0
19	12.5	39	10.2	59	24.2	79	12.5
20	13.0	40	10.6	60	24.7	80	13.0
21	13.5	41	11.0	61	25.2	81	13.5
22	14.0	42	11.4	62	25.7	82	14.0
23	14.5	43	11.8	63	26.2	83	14.5
24	15.0	44	12.2	64	26.7	84	15.0
25	15.5	45	12.6	65	27.2	85	15.5
26	16.0	46	13.0	66	27.7	86	16.0
27	16.5	47	13.4	67	28.2	87	16.5
28	17.0	48	13.8	68	28.7	88	17.0
29	17.5	49	14.2	69	29.2	89	17.5
30	18.0	50	14.6	70	29.7	90	18.0
31	18.5	51	15.0	71	30.2	91	18.5
32	19.0	52	15.4	72	30.7	92	19.0
33	19.5	53	15.8	73	31.2	93	19.5
34	20.0	54	16.2	74	31.7	94	20.0
35	20.5	55	16.6	75	32.2	95	20.5
36	21.0	56	17.0	76	32.7	96	21.0
37	21.5	57	17.4	77	33.2	97	21.5
38	22.0	58	17.8	78	33.7	98	22.0
39	22.5	59	18.2	79	34.2	99	22.5
40	23.0	60	18.6	80	34.7	100	23.0

Table XV

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 14

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	3.2	119	5.0	136	4.5	153	10.2
102	1.8	120	4.1	137	6.6	154	6.5
103	9.5	121	8.5	138	2.9	155	4.4
104	9.9	122	5.2	139	13.2	156	3.2
105	5.0	123	26.5	140	1.8	157	3.4
106	7.9	124	6.0	141	2.9	158	3.0
107	10.0	125	18.0	142	22.9	159	8.9
108	3.2	126	15.5	143	3.5	160	9.0
109	10.9	127	3.3	144	4.3	161	27.9
110	14.9	128	9.8	145	1.1	162	7.0
111	8.6	129	1.2	146	12.9	163	3.0
112	37.6	130	6.0	147	14.8	164	1.7
113	11.5	131	10.8	148	2.0	165	4.3
114	49.9	132	4.9	149	6.1	166	3.1
115	9.5	133	3.0	150	2.1	167	3.9
116	14.8	134	3.6	151	47.6	168	40.1
117	8.0	135	4.0	152	10.0	169	4.1
118	12.3						

Table XV

TABLE CONTAINING DISTANCES (mm) FROM THE NO. 14

NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE	NO.	DISTANCE
101	2.5	119	2.0	137	4.5	155	10.5
102	1.3	120	4.1	138	6.0	156	6.5
103	2.2	121	6.2	139	2.2	157	4.4
104	2.2	122	2.5	140	13.5	158	2.5
105	2.0	123	26.2	141	1.2	159	3.4
106	1.2	124	6.0	142	5.2	160	3.0
107	10.0	125	12.0	143	15.2	161	2.2
108	3.5	126	1.5	144	3.2	162	3.0
109	10.2	127	2.3	145	4.3	163	21.2
110	14.2	128	2.2	146	1.1	164	1.0
111	2.0	129	1.5	147	15.2	165	2.0
112	25.0	130	0.0	148	14.2	166	1.1
113	11.5	131	10.2	149	2.0	167	2.2
114	22.2	132	4.2	150	1.1	168	1.1
115	2.2	133	2.0	151	5.1	169	2.2
116	14.2	134	2.0	152	45.2	170	10.1
117	6.0	135	4.0	153	1.0	171	4.2
118	15.2						

Table XVI

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 15

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	5.1	26	4.7	51	9.0	76	25.0
2	5.0	27	3.5	52	7.0	77	8.3
3	4.0	28	5.0	53	16.8	78	19.2
4	1.4	29	11.3	54	11.5	79	2.6
5	2.2	30	8.3	55	1.2	80	3.5
6	9.3	31	6.1	56	2.0	81	.6
7	5.0	32	33.0	57	8.2	82	2.5
8	18.8	33	8.0	58	3.6	83	1.0
9	3.0	34	1.3	59	45.0	84	8.0
10	4.8	35	7.0	60	23.3	85	21.8
11	6.1	36	7.0	61	20.9	86	6.9
12	4.7	37	5.1	62	17.6	87	2.0
13	28.7	38	1.4	63	7.5	88	50.5
14	5.2	39	8.4	64	6.5	89	9.9
15	4.7	40	5.5	65	4.0	90	10.3
16	2.7	41	5.2	66	11.5	91	14.0
17	9.0	42	3.9	67	8.0	92	8.6
18	3.2	43	17.0	68	17.2	93	21.6
19	1.1	44	9.0	69	11.0	94	18.7
20	25.3	45	37.5	70	24.7	95	8.6
21	8.4	46	14.0	71	0.7	96	5.0
22	2.0	47	5.3	72	10.3	97	6.5
23	5.4	48	5.5	73	7.4	98	3.5
24	4.7	49	6.0	74	15.1	99	6.0
25	7.0	50	2.2	75	7.3	100	3.3

Table XVI

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 15

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	4.6	111	4.7	121	9.8	131	18.2
102	32.6	112	5.3	122	5.3	132	40.0
103	88.4	113	47.2	123	7.1	133	40.9
104	2.0	114	8.6	124	4.0	134	5.0
105	5.1	115	10.0	125	10.4	135	28.5
106	3.9	116	2.2	126	20.0	136	13.2
107	5.5	117	10.8	127	84.4	137	10.2
108	5.4	118	4.7	128	22.5	138	13.3
109	18.8	119	18.3	129	9.0	139	5.4
110	10.5	120	8.0	130	5.0	140	12.5

Table XVI

TABLE CONTACT DISTANCE (mm) FOR TAP NO. 12

CONTACT DISTANCE	NO.	CONTACT DISTANCE	NO.	CONTACT DISTANCE	NO.	CONTACT DISTANCE	NO.
18.5	131	2.2	151	7.4	111	0.4	101
10.0	135	2.2	155	2.2	115	0.52	105
10.0	133	1.1	153	5.54	113	0.28	103
0.2	134	0.4	154	0.8	114	0.8	104
1.85	132	10.4	152	10.0	112	1.1	102
5.51	130	0.05	150	2.8	110	2.2	100
10.5	137	4.42	157	10.0	117	2.2	107
12.2	136	2.55	156	7.7	116	4.2	106
2.4	138	1.0	158	18.2	118	18.2	108
15.2	140	2.0	159	0.0	150	10.2	110

Table XVII

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 16

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	2.7	12	2.4	23	24.9	33	15.0
2	10.0	13	1.5	24	21.0	34	7.7
3	5.3	14	4.5	25	4.5	35	7.4
4	6.3	15	5.0	26	2.6	36	2.0
5	1.6	16	8.1	27	25.8	37	5.3
6	2.9	17	8.9	28	6.2	38	4.5
7	3.0	18	3.2	29	4.0	39	11.6
8	7.9	19	2.9	30	15.5	40	8.6
9	4.6	20	3.5	31	5.8	41	50.8
10	7.9	21	3.5	32	6.0	42	15.6
11	15.7	22	4.0				

Table VIII

TABLE VIII. CONTACT DISTANCE (mm) FOR TEST NO. 15

TEST NO.	CONTACT DISTANCE (mm)	TEST NO.	CONTACT DISTANCE (mm)	TEST NO.	CONTACT DISTANCE (mm)	TEST NO.	CONTACT DISTANCE (mm)
1	1.1	15	1.5	29	1.5	43	1.5
2	1.0	16	1.2	30	1.2	44	1.5
3	1.0	17	1.4	31	1.4	45	1.5
4	1.0	18	1.0	32	1.0	46	1.5
5	1.0	19	1.1	33	1.1	47	1.5
6	1.0	20	1.0	34	1.0	48	1.5
7	1.0	21	1.0	35	1.0	49	1.5
8	1.0	22	1.0	36	1.0	50	1.5
9	1.0	23	1.0	37	1.0	51	1.5
10	1.0	24	1.0	38	1.0	52	1.5
11	1.0	25	1.0	39	1.0	53	1.5

Table XVIII

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 17

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	2.6	26	5.8	51	4.1	76	10.2
2	3.3	27	8.1	52	10.9	77	8.9
3	.5	28	6.0	53	5.6	78	2.1
4	34.7	29	4.0	54	2.4	79	5.8
5	5.7	30	2.3	55	3.7	80	2.1
6	12.1	31	3.7	56	8.8	81	1.7
7	4.5	32	3.9	57	7.4	82	8.8
8	1.9	33	5.1	58	8.5	83	3.3
9	3.8	34	22.9	59	4.0	84	5.0
10	3.7	35	11.8	60	6.3	85	.5
11	4.3	36	9.0	61	4.2	86	3.3
12	.8	37	2.3	62	10.5	87	5.4
13	21.0	38	2.0	63	4.7	88	4.7
14	10.8	39	.5	64	2.3	89	7.0
15	24.9	40	3.8	65	3.7	90	4.9
16	5.5	41	2.5	66	11.0	91	3.8
17	2.7	42	1.9	67	2.1	92	6.9
18	2.4	43	1.0	68	9.0	93	7.2
19	2.8	44	12.3	69	3.5	94	6.2
20	1.2	45	2.8	70	4.1	95	2.7
21	5.7	46	8.8	71	1.8	96	7.1
22	3.6	47	2.2	72	1.5	97	5.6
23	8.8	48	2.8	73	2.2	98	3.4
24	2.0	49	8.3	74	9.7	99	27.7
25	2.7	50	2.0	75	10.3	100	20.4

Table VIII

TABLE VIII. CONTACT DISTANCES (mm) BETWEEN CONTACTS

NO.	CONTACT	NO.	CONTACT	NO.	CONTACT	NO.	CONTACT
1	1.5	35	1.5	69	1.5	103	1.5
2	2.2	36	1	70	10.3	104	1.5
3	2	37	0.7	71	0.7	105	1.5
4	2.45	38	0.7	72	0.7	106	1.5
5	2.1	39	2.2	73	2.2	107	1.5
6	1.5	40	2.2	74	2.2	108	1.5
7	4.2	41	2.2	75	2.2	109	1.5
8	1.3	42	2.2	76	2.2	110	1.5
9	2.8	43	2.2	77	2.2	111	1.5
10	2.2	44	2.2	78	2.2	112	1.5
11	4.3	45	2.2	79	2.2	113	1.5
12	2	46	2.2	80	2.2	114	1.5
13	2	47	2.2	81	2.2	115	1.5
14	2.1	48	2.2	82	2.2	116	1.5
15	2.4	49	2.2	83	2.2	117	1.5
16	2.4	50	2.2	84	2.2	118	1.5
17	2.4	51	2.2	85	2.2	119	1.5
18	2.4	52	2.2	86	2.2	120	1.5
19	2.4	53	2.2	87	2.2	121	1.5
20	2.4	54	2.2	88	2.2	122	1.5
21	2.4	55	2.2	89	2.2	123	1.5
22	2.4	56	2.2	90	2.2	124	1.5
23	2.4	57	2.2	91	2.2	125	1.5
24	2.4	58	2.2	92	2.2	126	1.5
25	2.4	59	2.2	93	2.2	127	1.5
26	2.4	60	2.2	94	2.2	128	1.5
27	2.4	61	2.2	95	2.2	129	1.5
28	2.4	62	2.2	96	2.2	130	1.5
29	2.4	63	2.2	97	2.2	131	1.5
30	2.4	64	2.2	98	2.2	132	1.5
31	2.4	65	2.2	99	2.2	133	1.5
32	2.4	66	2.2	100	2.2	134	1.5
33	2.4	67	2.2	101	2.2	135	1.5
34	2.4	68	2.2	102	2.2	136	1.5

Table XVIII

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 17

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	7.0	126	3.7	151	38.0	176	59.3
102	5.5	127	2.6	152	2.5	177	36.5
103	7.0	128	2.0	153	15.3	178	17.1
104	31.9	129	2.8	154	17.3	179	2.3
105	5.7	130	2.8	155	4.0	180	5.3
106	3.9	131	4.6	156	4.6	181	7.2
107	2.0	132	2.2	157	8.8	182	2.4
108	4.2	133	3.9	158	1.0	183	3.5
109	24.8	134	4.3	159	7.0	184	2.0
110	5.5	135	2.4	160	6.0	185	12.4
111	6.0	136	2.1	161	3.7	186	2.4
112	8.3	137	9.3	162	7.9	187	8.2
113	11.9	138	9.5	163	1.8	188	4.0
114	12.0	139	3.9	164	2.1	189	3.4
115	3.5	140	5.0	165	1.2	190	14.2
116	5.4	141	12.2	166	7.0	191	5.3
117	6.9	142	5.0	167	5.7	192	3.0
118	4.1	143	.8	168	4.0	193	7.4
119	8.0	144	3.8	169	11.0	194	19.2
120	.7	145	5.9	170	5.6	195	2.4
121	5.0	146	2.4	171	110.7	196	4.4
122	.5	147	3.2	172	.5	197	2.5
123	5.9	148	11.9	173	21.6	198	2.0
124	.4	149	5.3	174	3.8	199	3.4
125	7.2	150	22.2	175	25.7	200	3.8

TABLE VIII

THERMAL STABILITY OF POLYMERIZATION OF VINYL MONOMERS

MONOMER	INITIAL CONCENTRATION (M)	INITIAL TEMPERATURE (°C)	INITIAL PRESSURE (ATM)	INITIAL VOLUME (L)	INITIAL WEIGHT (G)	INITIAL DENSITY (G/CM ³)	INITIAL VISCOSITY (POISE)
1.0	0.01	100	1.0	1.0	1.0	1.0	1.0
2.0	0.02	100	1.0	1.0	1.0	1.0	1.0
3.0	0.03	100	1.0	1.0	1.0	1.0	1.0
4.0	0.04	100	1.0	1.0	1.0	1.0	1.0
5.0	0.05	100	1.0	1.0	1.0	1.0	1.0
6.0	0.06	100	1.0	1.0	1.0	1.0	1.0
7.0	0.07	100	1.0	1.0	1.0	1.0	1.0
8.0	0.08	100	1.0	1.0	1.0	1.0	1.0
9.0	0.09	100	1.0	1.0	1.0	1.0	1.0
10.0	0.10	100	1.0	1.0	1.0	1.0	1.0
11.0	0.11	100	1.0	1.0	1.0	1.0	1.0
12.0	0.12	100	1.0	1.0	1.0	1.0	1.0
13.0	0.13	100	1.0	1.0	1.0	1.0	1.0
14.0	0.14	100	1.0	1.0	1.0	1.0	1.0
15.0	0.15	100	1.0	1.0	1.0	1.0	1.0
16.0	0.16	100	1.0	1.0	1.0	1.0	1.0
17.0	0.17	100	1.0	1.0	1.0	1.0	1.0
18.0	0.18	100	1.0	1.0	1.0	1.0	1.0
19.0	0.19	100	1.0	1.0	1.0	1.0	1.0
20.0	0.20	100	1.0	1.0	1.0	1.0	1.0
21.0	0.21	100	1.0	1.0	1.0	1.0	1.0
22.0	0.22	100	1.0	1.0	1.0	1.0	1.0
23.0	0.23	100	1.0	1.0	1.0	1.0	1.0
24.0	0.24	100	1.0	1.0	1.0	1.0	1.0
25.0	0.25	100	1.0	1.0	1.0	1.0	1.0
26.0	0.26	100	1.0	1.0	1.0	1.0	1.0
27.0	0.27	100	1.0	1.0	1.0	1.0	1.0
28.0	0.28	100	1.0	1.0	1.0	1.0	1.0
29.0	0.29	100	1.0	1.0	1.0	1.0	1.0
30.0	0.30	100	1.0	1.0	1.0	1.0	1.0

Table XVIII

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 17

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
201	5.6	220	22.6	239	6.0	258	4.0
202	3.9	221	2.1	240	4.0	259	4.0
203	8.9	222	2.4	241	5.7	260	.7
204	7.0	223	5.4	242	2.2	261	9.3
205	1.7	224	6.2	243	1.9	262	3.8
206	6.3	225	4.0	244	2.6	263	1.7
207	5.2	226	4.0	245	1.0	264	2.0
208	7.3	227	5.7	246	1.6	265	10.9
209	2.8	228	6.0	247	6.0	266	3.6
210	7.0	229	22.0	248	4.7	267	1.7
211	2.8	230	5.9	249	11.0	268	5.9
212	4.0	231	4.0	250	6.0	269	5.7
213	7.3	232	16.0	251	24.0	270	4.0
214	3.5	233	4.0	252	10.5	271	3.0
215	7.0	234	9.0	253	7.2	272	3.8
216	4.7	235	10.5	254	4.0	273	1.5
217	.8	236	10.7	255	2.7	274	3.7
218	8.3	237	4.3	256	3.5	275	8.8
219	27.6	238	5.6	257	3.8	276	.9

Table XVIII

THERMAL STABILITY OF POLYMERIZATION

NO.	INITIAL	NO.	INITIAL	NO.	INITIAL	NO.	INITIAL
101	0.0	102	0.0	103	0.0	104	0.0
105	0.0	106	0.0	107	0.0	108	0.0
109	0.0	110	0.0	111	0.0	112	0.0
113	0.0	114	0.0	115	0.0	116	0.0
117	0.0	118	0.0	119	0.0	120	0.0
121	0.0	122	0.0	123	0.0	124	0.0
125	0.0	126	0.0	127	0.0	128	0.0
129	0.0	130	0.0	131	0.0	132	0.0
133	0.0	134	0.0	135	0.0	136	0.0
137	0.0	138	0.0	139	0.0	140	0.0
141	0.0	142	0.0	143	0.0	144	0.0
145	0.0	146	0.0	147	0.0	148	0.0
149	0.0	150	0.0	151	0.0	152	0.0
153	0.0	154	0.0	155	0.0	156	0.0
157	0.0	158	0.0	159	0.0	160	0.0
161	0.0	162	0.0	163	0.0	164	0.0
165	0.0	166	0.0	167	0.0	168	0.0
169	0.0	170	0.0	171	0.0	172	0.0
173	0.0	174	0.0	175	0.0	176	0.0
177	0.0	178	0.0	179	0.0	180	0.0
181	0.0	182	0.0	183	0.0	184	0.0
185	0.0	186	0.0	187	0.0	188	0.0
189	0.0	190	0.0	191	0.0	192	0.0
193	0.0	194	0.0	195	0.0	196	0.0
197	0.0	198	0.0	199	0.0	200	0.0

Table XIX

TAP CONTACT DISTANCES (mm) FOR TAP No. 18

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
1	5.3	26	2.6	51	10.1	76	8.2
2	5.0	27	5.7	52	13.9	77	8.0
3	2.2	28	4.3	53	9.0	78	5.3
4	4.9	29	2.0	54	8.8	79	2.4
5	3.2	30	1.6	55	10.8	80	1.5
6	3.5	31	2.0	56	2.3	81	17.0
7	14.3	32	8.6	57	7.0	82	5.2
8	21.1	33	6.6	58	7.1	83	14.0
9	37.2	34	6.3	59	4.0	84	9.2
10	7.4	35	8.0	60	3.3	85	3.3
11	7.4	36	2.2	61	2.3	86	13.6
12	4.1	37	3.6	62	4.9	87	119.9
13	24.0	38	23.0	63	3.7	88	81.0
14	56.6	39	.9	64	12.5	89	9.8
15	6.0	40	8.9	65	2.4	90	24.7
16	4.5	41	.9	66	2.0	91	47.4
17	5.3	42	13.0	67	4.5	92	8.9
18	13.1	43	9.4	68	8.0	93	2.3
19	3.0	44	6.2	69	11.0	94	2.4
20	16.9	45	5.4	70	13.5	95	5.6
21	9.0	46	14.4	71	5.9	96	3.3
22	10.0	47	3.2	72	2.3	97	3.7
23	60.3	48	1.3	73	8.2	98	9.0
24	2.2	49	7.8	74	6.7	99	26.1
25	5.6	50	2.1	75	12.3	100	4.6

Table 1

Table 1. Summary of the data for the 1990-1991 season.

Year	Month	Day	Time	Location	Species	Count	Notes
1990	Jan	1	08:00	100m	1	1	
1990	Jan	2	08:00	100m	2	2	
1990	Jan	3	08:00	100m	3	3	
1990	Jan	4	08:00	100m	4	4	
1990	Jan	5	08:00	100m	5	5	
1990	Jan	6	08:00	100m	6	6	
1990	Jan	7	08:00	100m	7	7	
1990	Jan	8	08:00	100m	8	8	
1990	Jan	9	08:00	100m	9	9	
1990	Jan	10	08:00	100m	10	10	
1990	Jan	11	08:00	100m	11	11	
1990	Jan	12	08:00	100m	12	12	
1990	Jan	13	08:00	100m	13	13	
1990	Jan	14	08:00	100m	14	14	
1990	Jan	15	08:00	100m	15	15	
1990	Jan	16	08:00	100m	16	16	
1990	Jan	17	08:00	100m	17	17	
1990	Jan	18	08:00	100m	18	18	
1990	Jan	19	08:00	100m	19	19	
1990	Jan	20	08:00	100m	20	20	
1990	Jan	21	08:00	100m	21	21	
1990	Jan	22	08:00	100m	22	22	
1990	Jan	23	08:00	100m	23	23	
1990	Jan	24	08:00	100m	24	24	
1990	Jan	25	08:00	100m	25	25	
1990	Jan	26	08:00	100m	26	26	
1990	Jan	27	08:00	100m	27	27	
1990	Jan	28	08:00	100m	28	28	
1990	Jan	29	08:00	100m	29	29	
1990	Jan	30	08:00	100m	30	30	

Table XIX

TANK CONTACT DISTANCES (mm) FOR TANK No. 18

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
101	2.0	126	14.0	151	1.7	176	9.0
102	7.5	127	3.3	152	4.4	177	9.0
103	5.5	128	9.0	153	7.3	178	4.0
104	5.9	129	7.3	154	1.8	179	42.7
105	4.5	130	8.6	155	9.7	180	7.6
106	9.6	131	6.3	156	5.4	181	3.0
107	6.0	132	20.0	157	4.1	182	2.2
108	19.0	133	26.0	158	22.8	183	15.7
109	20.9	134	3.0	159	2.6	184	22.9
110	4.0	135	7.4	160	7.2	185	2.5
111	3.2	136	8.7	161	7.2	186	2.5
112	2.3	137	5.5	162	19.4	187	199.0
113	3.3	138	1.2	163	21.1	188	10.6
114	7.4	139	7.0	164	4.0	189	8.3
115	5.2	140	6.4	165	21.4	190	5.8
116	8.3	141	2.2	166	24.0	191	2.0
117	3.1	142	3.3	167	30.7	192	38.2
118	17.7	143	15.5	168	7.7	193	7.1
119	7.1	144	4.0	169	2.6	194	21.2
120	10.0	145	5.4	170	12.9	195	17.3
121	7.6	146	8.0	171	22.9	196	5.7
122	21.1	147	7.4	172	9.0	197	3.0
123	7.0	148	12.0	173	17.9	198	14.4
124	2.3	149	6.0	174	22.4	199	6.2
125	4.0	150	2.0	175	24.2	200	4.2

Table XIX

TABLE XIX. (continued) (mm)

WAVELENGTH	REFRACTIVE INDEX	ABSORPTION	WAVELENGTH	REFRACTIVE INDEX	ABSORPTION
0.1	1.01	0.0	1.0	1.01	0.0
0.2	1.02	0.0	2.0	1.02	0.0
0.3	1.03	0.0	3.0	1.03	0.0
0.4	1.04	0.0	4.0	1.04	0.0
0.5	1.05	0.0	5.0	1.05	0.0
0.6	1.06	0.0	6.0	1.06	0.0
0.7	1.07	0.0	7.0	1.07	0.0
0.8	1.08	0.0	8.0	1.08	0.0
0.9	1.09	0.0	9.0	1.09	0.0
1.0	1.10	0.0	10.0	1.10	0.0
1.1	1.11	0.0	11.0	1.11	0.0
1.2	1.12	0.0	12.0	1.12	0.0
1.3	1.13	0.0	13.0	1.13	0.0
1.4	1.14	0.0	14.0	1.14	0.0
1.5	1.15	0.0	15.0	1.15	0.0
1.6	1.16	0.0	16.0	1.16	0.0
1.7	1.17	0.0	17.0	1.17	0.0
1.8	1.18	0.0	18.0	1.18	0.0
1.9	1.19	0.0	19.0	1.19	0.0
2.0	1.20	0.0	20.0	1.20	0.0
2.1	1.21	0.0	21.0	1.21	0.0
2.2	1.22	0.0	22.0	1.22	0.0
2.3	1.23	0.0	23.0	1.23	0.0
2.4	1.24	0.0	24.0	1.24	0.0
2.5	1.25	0.0	25.0	1.25	0.0
2.6	1.26	0.0	26.0	1.26	0.0
2.7	1.27	0.0	27.0	1.27	0.0
2.8	1.28	0.0	28.0	1.28	0.0
2.9	1.29	0.0	29.0	1.29	0.0
3.0	1.30	0.0	30.0	1.30	0.0
3.1	1.31	0.0	31.0	1.31	0.0
3.2	1.32	0.0	32.0	1.32	0.0
3.3	1.33	0.0	33.0	1.33	0.0
3.4	1.34	0.0	34.0	1.34	0.0
3.5	1.35	0.0	35.0	1.35	0.0
3.6	1.36	0.0	36.0	1.36	0.0
3.7	1.37	0.0	37.0	1.37	0.0
3.8	1.38	0.0	38.0	1.38	0.0
3.9	1.39	0.0	39.0	1.39	0.0
4.0	1.40	0.0	40.0	1.40	0.0

Table XIX

TAPE CONTACT DISTANCES (mm) FOR TAPE No. 18

No.	DISTANCE	No.	DISTANCE	No.	DISTANCE	No.	DISTANCE
201	5.4	219	3.2	236	6.0	253	9.0
202	4.1	220	5.0	237	40.5	254	40.6
203	2.1	221	14.1	238	3.8	255	23.0
204	2.6	222	4.2	239	4.0	256	15.7
205	19.0	223	1.0	240	10.0	257	7.5
206	12.5	224	2.6	241	4.0	258	2.2
207	6.0	225	3.8	242	17.5	259	4.4
208	2.0	226	1.9	243	3.9	260	10.4
209	2.2	227	26.0	244	13.7	261	2.5
210	2.5	228	98.0	245	4.0	262	2.5
211	0.0	229	5.6	246	14.0	263	21.0
212	1.8	230	9.2	247	4.7	264	7.0
213	3.9	231	0.9	248	1.0	265	3.7
214	3.7	232	7.3	249	4.0	266	5.5
215	4.4	233	2.6	250	3.2	267	2.4
216	2.3	234	2.0	251	34.3	268	6.0
217	1.7	235	2.3	252	69.3	269	3.4
218	10.8						

Table XIX

THE COMPARISON OF THE TWO METHODS

Year	1900	1901	1902	1903	1904	1905	1906
1900	100	100	100	100	100	100	100
1901	100	100	100	100	100	100	100
1902	100	100	100	100	100	100	100
1903	100	100	100	100	100	100	100
1904	100	100	100	100	100	100	100
1905	100	100	100	100	100	100	100
1906	100	100	100	100	100	100	100
1907	100	100	100	100	100	100	100
1908	100	100	100	100	100	100	100
1909	100	100	100	100	100	100	100
1910	100	100	100	100	100	100	100
1911	100	100	100	100	100	100	100
1912	100	100	100	100	100	100	100
1913	100	100	100	100	100	100	100
1914	100	100	100	100	100	100	100
1915	100	100	100	100	100	100	100
1916	100	100	100	100	100	100	100
1917	100	100	100	100	100	100	100
1918	100	100	100	100	100	100	100
1919	100	100	100	100	100	100	100
1920	100	100	100	100	100	100	100
1921	100	100	100	100	100	100	100
1922	100	100	100	100	100	100	100
1923	100	100	100	100	100	100	100
1924	100	100	100	100	100	100	100
1925	100	100	100	100	100	100	100
1926	100	100	100	100	100	100	100
1927	100	100	100	100	100	100	100
1928	100	100	100	100	100	100	100
1929	100	100	100	100	100	100	100
1930	100	100	100	100	100	100	100

APPENDIX E

Tabulated Distribution of Contact Areas

	Page
Table XX. Table of Contact Area Distribution for All Tapes	54
Table XXI. Table of Contact Area Distribution for Tape 6	55

THEORY

1. The theory of the present is the theory of the past.

2.

The theory of the present is the theory of the past.

.....

The theory of the present is the theory of the past.

3.

.....

Table XX

TABLE OF CONTACT AREA DISTRIBUTION FOR ALL TAPES

Contact Area ($\text{cm}^2 \times 10^5$)	Mean Area ($\text{cm}^2 \times 10^8$)	No. of Contacts	Contact Area ($\text{cm}^2 \times 10^5$)	Mean Area ($\text{cm}^2 \times 10^8$)	No. of Contacts
0	7.3	2524	146.0	123.3	4
14.6	21.9	155	160.6	167.9	3
29.2	36.5	69	175.2	182.5	3
43.8	51.1	39	189.8	197.1	4
58.4	65.7	29	204.4	211.7	5
73.0	80.3	7	219.0	226.3	3
87.6	94.9	10	233.6	240.9	3
102.2	109.5	12	248.2	255.5	2
116.8	124.1	8	262.8	270.1	2
131.4	138.7	8		284.7	3

DISTRIBUTION OF CONTACT AREAS LESS THAN $14.6 \times 10^{-6} \text{cm}^2$

Contact Area ($\text{cm}^2 \times 10^5$)	Mean Area ($\text{cm}^2 \times 10^8$)	No. of Contacts	Contact Area ($\text{cm}^2 \times 10^5$)	Mean Area ($\text{cm}^2 \times 10^8$)	No. of Contacts
0	.73	1558	7.30	8.03	54
1.46	2.19	417	8.76	9.49	48
2.92	3.65	178	10.22	10.95	30
4.38	5.11	100	11.68	12.41	19
5.84	6.55	90	13.14	13.87	30
7.30			14.60		

IN SUMMARY

ALL OF THE FOLLOWING ARE SUBJECTS OF THE

To, from subject	NAME LAST	POSITION TITLE	To, from subject	NAME LAST	POSITION TITLE
	(Last name)	(Last name)		(Last name)	(Last name)
1	1.1	1.1	1	1.1	1.1
2	1.1	1.1	2	1.1	1.1
3	1.1	1.1	3	1.1	1.1
4	1.1	1.1	4	1.1	1.1
5	1.1	1.1	5	1.1	1.1
6	1.1	1.1	6	1.1	1.1
7	1.1	1.1	7	1.1	1.1
8	1.1	1.1	8	1.1	1.1
9	1.1	1.1	9	1.1	1.1
10	1.1	1.1	10	1.1	1.1
11	1.1	1.1	11	1.1	1.1
12	1.1	1.1	12	1.1	1.1
13	1.1	1.1	13	1.1	1.1
14	1.1	1.1	14	1.1	1.1
15	1.1	1.1	15	1.1	1.1
16	1.1	1.1	16	1.1	1.1
17	1.1	1.1	17	1.1	1.1
18	1.1	1.1	18	1.1	1.1
19	1.1	1.1	19	1.1	1.1
20	1.1	1.1	20	1.1	1.1

ALL OF THE FOLLOWING ARE SUBJECTS OF THE

To, from subject	NAME LAST	POSITION TITLE	To, from subject	NAME LAST	POSITION TITLE
	(Last name)	(Last name)		(Last name)	(Last name)
1	1.1	1.1	1	1.1	1.1
2	1.1	1.1	2	1.1	1.1
3	1.1	1.1	3	1.1	1.1
4	1.1	1.1	4	1.1	1.1
5	1.1	1.1	5	1.1	1.1
6	1.1	1.1	6	1.1	1.1
7	1.1	1.1	7	1.1	1.1
8	1.1	1.1	8	1.1	1.1
9	1.1	1.1	9	1.1	1.1
10	1.1	1.1	10	1.1	1.1
11	1.1	1.1	11	1.1	1.1
12	1.1	1.1	12	1.1	1.1
13	1.1	1.1	13	1.1	1.1
14	1.1	1.1	14	1.1	1.1
15	1.1	1.1	15	1.1	1.1
16	1.1	1.1	16	1.1	1.1
17	1.1	1.1	17	1.1	1.1
18	1.1	1.1	18	1.1	1.1
19	1.1	1.1	19	1.1	1.1
20	1.1	1.1	20	1.1	1.1

Table XXI

CALCULATIONS TO OBTAIN DIAMETER OF AVERAGE CONTACT

DATA FOR TABLE NO. 8

D	N	$(D/2)^2$	$(L/2)^2 N$	D	N	$(L/2)^2$	$(D/2)^2 N$
0	258	12.5		0	148	1.3	192
10.0				3.2	30	3.8	114
14.1	27	37.5	101	4.5	24	6.3	151
17.3	20	62.5	125	5.5	22	8.8	193
20.0	7	87.5	612	6.3	15	11.3	170
22.4	6	112.5	675	7.1	8	13.2	110
24.5	3	137.5	413	7.7	8	16.3	130
26.4	3	162.5	488	8.4	1	18.8	19
28.3	4	187.5	751	8.9	1	21.3	21
30.0	4	212.5	848	9.5	1	23.2	24
31.6	3	237.5	712	10.0			
33.2	1	262.5	263		258		1124
34.6	1	287.5	287				
36.0	0	312.5	0				
37.4	1	337.5	338	46.3	1	550	550
38.7	2	362.5	725	47.8	1	572	572
40.0	2	387.5	775	55.2	1	762	762
41.2	1	412.5	412	60.0	1	900	900
42.4	2	437.5	875	72.2	1	1320	1320
43.6	1	462.5	462	81.4	1	1660	1660
44.7	1	487.5	488		6		5764
	<u>347</u>		<u>9350</u>				

Table 1

Summary of the results of the analysis of variance for the different factors

Source of variation

Factor	Level	Mean	Standard deviation	Sum of squares	D.F.	Mean square	F-value
1	1	5.0	1.0	1.0	1	1.0	1.0
2	2	5.0	1.0	1.0	1	1.0	1.0
3	3	5.0	1.0	1.0	1	1.0	1.0
4	4	5.0	1.0	1.0	1	1.0	1.0
5	5	5.0	1.0	1.0	1	1.0	1.0
6	6	5.0	1.0	1.0	1	1.0	1.0
7	7	5.0	1.0	1.0	1	1.0	1.0
8	8	5.0	1.0	1.0	1	1.0	1.0
9	9	5.0	1.0	1.0	1	1.0	1.0
10	10	5.0	1.0	1.0	1	1.0	1.0
11	11	5.0	1.0	1.0	1	1.0	1.0
12	12	5.0	1.0	1.0	1	1.0	1.0
13	13	5.0	1.0	1.0	1	1.0	1.0
14	14	5.0	1.0	1.0	1	1.0	1.0
15	15	5.0	1.0	1.0	1	1.0	1.0
16	16	5.0	1.0	1.0	1	1.0	1.0
17	17	5.0	1.0	1.0	1	1.0	1.0
18	18	5.0	1.0	1.0	1	1.0	1.0
19	19	5.0	1.0	1.0	1	1.0	1.0
20	20	5.0	1.0	1.0	1	1.0	1.0
21	21	5.0	1.0	1.0	1	1.0	1.0
22	22	5.0	1.0	1.0	1	1.0	1.0
23	23	5.0	1.0	1.0	1	1.0	1.0
24	24	5.0	1.0	1.0	1	1.0	1.0
25	25	5.0	1.0	1.0	1	1.0	1.0
26	26	5.0	1.0	1.0	1	1.0	1.0
27	27	5.0	1.0	1.0	1	1.0	1.0
28	28	5.0	1.0	1.0	1	1.0	1.0
29	29	5.0	1.0	1.0	1	1.0	1.0
30	30	5.0	1.0	1.0	1	1.0	1.0
31	31	5.0	1.0	1.0	1	1.0	1.0
32	32	5.0	1.0	1.0	1	1.0	1.0
33	33	5.0	1.0	1.0	1	1.0	1.0
34	34	5.0	1.0	1.0	1	1.0	1.0
35	35	5.0	1.0	1.0	1	1.0	1.0
36	36	5.0	1.0	1.0	1	1.0	1.0
37	37	5.0	1.0	1.0	1	1.0	1.0
38	38	5.0	1.0	1.0	1	1.0	1.0
39	39	5.0	1.0	1.0	1	1.0	1.0
40	40	5.0	1.0	1.0	1	1.0	1.0
41	41	5.0	1.0	1.0	1	1.0	1.0
42	42	5.0	1.0	1.0	1	1.0	1.0
43	43	5.0	1.0	1.0	1	1.0	1.0
44	44	5.0	1.0	1.0	1	1.0	1.0
45	45	5.0	1.0	1.0	1	1.0	1.0
46	46	5.0	1.0	1.0	1	1.0	1.0
47	47	5.0	1.0	1.0	1	1.0	1.0
48	48	5.0	1.0	1.0	1	1.0	1.0
49	49	5.0	1.0	1.0	1	1.0	1.0
50	50	5.0	1.0	1.0	1	1.0	1.0
51	51	5.0	1.0	1.0	1	1.0	1.0
52	52	5.0	1.0	1.0	1	1.0	1.0
53	53	5.0	1.0	1.0	1	1.0	1.0
54	54	5.0	1.0	1.0	1	1.0	1.0
55	55	5.0	1.0	1.0	1	1.0	1.0
56	56	5.0	1.0	1.0	1	1.0	1.0
57	57	5.0	1.0	1.0	1	1.0	1.0
58	58	5.0	1.0	1.0	1	1.0	1.0
59	59	5.0	1.0	1.0	1	1.0	1.0
60	60	5.0	1.0	1.0	1	1.0	1.0
61	61	5.0	1.0	1.0	1	1.0	1.0
62	62	5.0	1.0	1.0	1	1.0	1.0
63	63	5.0	1.0	1.0	1	1.0	1.0
64	64	5.0	1.0	1.0	1	1.0	1.0
65	65	5.0	1.0	1.0	1	1.0	1.0
66	66	5.0	1.0	1.0	1	1.0	1.0
67	67	5.0	1.0	1.0	1	1.0	1.0
68	68	5.0	1.0	1.0	1	1.0	1.0
69	69	5.0	1.0	1.0	1	1.0	1.0
70	70	5.0	1.0	1.0	1	1.0	1.0
71	71	5.0	1.0	1.0	1	1.0	1.0
72	72	5.0	1.0	1.0	1	1.0	1.0
73	73	5.0	1.0	1.0	1	1.0	1.0
74	74	5.0	1.0	1.0	1	1.0	1.0
75	75	5.0	1.0	1.0	1	1.0	1.0
76	76	5.0	1.0	1.0	1	1.0	1.0
77	77	5.0	1.0	1.0	1	1.0	1.0
78	78	5.0	1.0	1.0	1	1.0	1.0
79	79	5.0	1.0	1.0	1	1.0	1.0
80	80	5.0	1.0	1.0	1	1.0	1.0
81	81	5.0	1.0	1.0	1	1.0	1.0
82	82	5.0	1.0	1.0	1	1.0	1.0
83	83	5.0	1.0	1.0	1	1.0	1.0
84	84	5.0	1.0	1.0	1	1.0	1.0
85	85	5.0	1.0	1.0	1	1.0	1.0
86	86	5.0	1.0	1.0	1	1.0	1.0
87	87	5.0	1.0	1.0	1	1.0	1.0
88	88	5.0	1.0	1.0	1	1.0	1.0
89	89	5.0	1.0	1.0	1	1.0	1.0
90	90	5.0	1.0	1.0	1	1.0	1.0
91	91	5.0	1.0	1.0	1	1.0	1.0
92	92	5.0	1.0	1.0	1	1.0	1.0
93	93	5.0	1.0	1.0	1	1.0	1.0
94	94	5.0	1.0	1.0	1	1.0	1.0
95	95	5.0	1.0	1.0	1	1.0	1.0
96	96	5.0	1.0	1.0	1	1.0	1.0
97	97	5.0	1.0	1.0	1	1.0	1.0
98	98	5.0	1.0	1.0	1	1.0	1.0
99	99	5.0	1.0	1.0	1	1.0	1.0
100	100	5.0	1.0	1.0	1	1.0	1.0

APPENDIX F

Sample Calculations

	Page
I. Average Diameter of Contacts for Tape 8	57
II. Diameter of Average Contact Area for Tape 8	58

1000

1000 1000 1000 1000

1000

1000 1000 1000 1000 1000 1000 1000 1000 1000 1000

1000 1000 1000 1000 1000 1000 1000 1000 1000 1000

1000 1000 1000 1000 1000 1000 1000 1000 1000 1000

SAMPLE CALC. 21043

Average diameter of the contact
areas for Tape 8

The data for Tape 8 is given in Tables 1 and 9.

ΣN = total number of contacts = 353

Σd = sum of all contact tape distances = 3,060.5mm

\bar{d} = average contact tape distance

$\bar{d} = \Sigma d / \Sigma N = 3,060.5 / 353 = 8.675\text{mm}$

Tape speed = 100mm/sec.

Crossing speed = $r\Omega$

where: r = distance from center of rotation of the
slider to the probe contact wire in mm.

Ω = angular velocity of the slider in
radians/sec.

Crossing speed = $(1.2 \times 25.4) (24/441)(\pi/60) = .0866\text{mm/sec.}$

d_d = average diameter of the contact areas

$d_d = \frac{\bar{d} \times (\text{crossing speed})}{2 \times (\text{tape speed})} = \frac{8.675(.0866)}{2 \times (100)} = 3.77 \times 10^{-4}\text{cm.}$

1990

1. *Phragmites* (common)

1947. 1948. 1949. 1950. 1951. 1952. 1953. 1954. 1955. 1956. 1957. 1958. 1959. 1960. 1961. 1962. 1963. 1964. 1965. 1966. 1967. 1968. 1969. 1970. 1971. 1972. 1973. 1974. 1975. 1976. 1977. 1978. 1979. 1980. 1981. 1982. 1983. 1984. 1985. 1986. 1987. 1988. 1989. 1990. 1991. 1992. 1993. 1994. 1995. 1996. 1997. 1998. 1999. 2000. 2001. 2002. 2003. 2004. 2005. 2006. 2007. 2008. 2009. 2010. 2011. 2012. 2013. 2014. 2015. 2016. 2017. 2018. 2019. 2020. 2021. 2022. 2023. 2024. 2025. 2026. 2027. 2028. 2029. 2030. 2031. 2032. 2033. 2034. 2035. 2036. 2037. 2038. 2039. 2040. 2041. 2042. 2043. 2044. 2045. 2046. 2047. 2048. 2049. 2050. 2051. 2052. 2053. 2054. 2055. 2056. 2057. 2058. 2059. 2060. 2061. 2062. 2063. 2064. 2065. 2066. 2067. 2068. 2069. 2070. 2071. 2072. 2073. 2074. 2075. 2076. 2077. 2078. 2079. 2080. 2081. 2082. 2083. 2084. 2085. 2086. 2087. 2088. 2089. 2090. 2091. 2092. 2093. 2094. 2095. 2096. 2097. 2098. 2099. 2100. 2101. 2102. 2103. 2104. 2105. 2106. 2107. 2108. 2109. 2110. 2111. 2112. 2113. 2114. 2115. 2116. 2117. 2118. 2119. 2120. 2121. 2122. 2123. 2124. 2125. 2126. 2127. 2128. 2129. 2130. 2131. 2132. 2133. 2134. 2135. 2136. 2137. 2138. 2139. 2140. 2141. 2142. 2143. 2144. 2145. 2146. 2147. 2148. 2149. 2150. 2151. 2152. 2153. 2154. 2155. 2156. 2157. 2158. 2159. 2160. 2161. 2162. 2163. 2164. 2165. 2166. 2167. 2168. 2169. 2170. 2171. 2172. 2173. 2174. 2175. 2176. 2177. 2178. 2179. 2180. 2181. 2182. 2183. 2184. 2185. 2186. 2187. 2188. 2189. 2190. 2191. 2192. 2193. 2194. 2195. 2196. 2197. 2198. 2199. 2200. 2201. 2202. 2203. 2204. 2205. 2206. 2207. 2208. 2209. 2210. 2211. 2212. 2213. 2214. 2215. 2216. 2217. 2218. 2219. 2220. 2221. 2222. 2223. 2224. 2225. 2226. 2227. 2228. 2229. 2230. 2231. 2232. 2233. 2234. 2235. 2236. 2237. 2238. 2239. 2240. 2241. 2242. 2243. 2244. 2245. 2246. 2247. 2248. 2249. 2250. 2251. 2252. 2253. 2254. 2255. 2256. 2257. 2258. 2259. 2260. 2261. 2262. 2263. 2264. 2265. 2266. 2267. 2268. 2269. 2270. 2271. 2272. 2273. 2274. 2275. 2276. 2277. 2278. 2279. 2280. 2281. 2282. 2283. 2284. 2285. 2286. 2287. 2288. 2289. 2290. 2291. 2292. 2293. 2294. 2295. 2296. 2297. 2298. 2299. 2300. 2301. 2302. 2303. 2304. 2305. 2306. 2307. 2308. 2309. 2310. 2311. 2312. 2313. 2314. 2315. 2316. 2317. 2318. 2319. 2320. 2321. 2322. 2323. 2324. 2325. 2326. 2327. 2328. 2329. 2330. 2331. 2332. 2333. 2334. 2335. 2336. 2337. 2338. 2339. 2340. 2341. 2342. 2343. 2344. 2345. 2346. 2347. 2348. 2349. 2350. 2351. 2352. 2353. 2354. 2355. 2356. 2357. 2358. 2359. 2360. 2361. 2362. 2363. 2364. 2365. 2366. 2367. 2368. 2369. 2370. 2371. 2372. 2373. 2374. 2375. 2376. 2377. 2378. 2379. 2380. 2381. 2382. 2383. 2384. 2385. 2386. 2387. 2388. 2389. 2390. 2391. 2392. 2393. 2394. 2395. 2396. 2397. 2398. 2399. 2400. 2401. 2402. 2403. 2404. 2405. 2406. 2407. 2408. 2409. 2410. 2411. 2412. 2413. 2414. 2415. 2416. 2417. 2418. 2419. 2420. 2421. 2422. 2423. 2424. 2425. 2426. 2427. 2428. 2429. 2430. 2431. 2432. 2433. 2434. 2435. 2436. 2437. 2438. 2439. 2440. 2441. 2442. 2443. 2444. 2445. 2446. 2447. 2448. 2449. 2450. 2451. 2452. 2453. 2454. 2455. 2456. 2457. 2458. 2459. 2460. 2461. 2462. 2463. 2464. 2465. 2466. 2467. 2468. 2469. 2470. 2471. 2472. 2473. 2474. 2475. 2476. 2477. 2478. 2479. 2480. 2481. 2482. 2483. 2484. 2485. 2486. 2487. 2488. 2489. 2490. 2491. 2492. 2493. 2494. 2495. 2496. 2497. 2498. 2499. 2500. 2501. 2502. 2503. 2504. 2505. 2506. 2507. 2508. 2509. 2510. 2511. 2512. 2513. 2514. 2515. 2516. 2517. 2518. 2519. 2520. 2521. 2522. 2523. 2524. 2525. 2526. 2527. 2528. 2529. 2530. 2531. 2532. 2533. 2534. 2535. 2536. 2537. 2538. 2539. 2540. 2541. 2542. 2543. 2544. 2545. 2546. 2547. 2548. 2549. 2550. 2551. 2552. 2553. 2554. 2555. 2556. 2557. 2558. 2559. 2560. 2561. 2562. 2563. 2564. 2565. 2566. 2567. 2568. 2569. 2570. 2571. 2572. 2573. 2574. 2575. 2576. 2577. 2578. 2579. 2580. 2581. 2582. 2583. 2584. 2585. 2586. 2587. 2588. 2589. 2590. 2591. 2592. 2593. 2594. 2595. 2596. 2597. 2598. 2599. 2600. 2601. 2602. 2603. 2604. 2605. 2606. 2607. 2608. 2609. 2610. 2611. 2612. 2613. 2614. 2615. 2616. 2617. 2618. 2619. 2620. 2621. 2622. 2623. 2624. 2625. 2626. 2627. 2628. 26

$$T = 240 \text{ min} = 4 \text{ hr} \quad \text{and} \quad T = 240 \text{ min} = 4 \text{ hr}$$

100-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1

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M M

1. The first group of people who are interested in the study of the history of the United States are the people who are interested in the history of the United States.

Ω₁ = 1, Ω₂ = 2, Ω₃ = 3, Ω₄ = 4, Ω₅ = 5, Ω₆ = 6, Ω₇ = 7, Ω₈ = 8, Ω₉ = 9, Ω₁₀ = 10, Ω₁₁ = 11, Ω₁₂ = 12, Ω₁₃ = 13, Ω₁₄ = 14, Ω₁₅ = 15, Ω₁₆ = 16, Ω₁₇ = 17, Ω₁₈ = 18, Ω₁₉ = 19, Ω₂₀ = 20, Ω₂₁ = 21, Ω₂₂ = 22, Ω₂₃ = 23, Ω₂₄ = 24, Ω₂₅ = 25, Ω₂₆ = 26, Ω₂₇ = 27, Ω₂₈ = 28, Ω₂₉ = 29, Ω₃₀ = 30, Ω₃₁ = 31, Ω₃₂ = 32, Ω₃₃ = 33, Ω₃₄ = 34, Ω₃₅ = 35, Ω₃₆ = 36, Ω₃₇ = 37, Ω₃₈ = 38, Ω₃₉ = 39, Ω₄₀ = 40, Ω₄₁ = 41, Ω₄₂ = 42, Ω₄₃ = 43, Ω₄₄ = 44, Ω₄₅ = 45, Ω₄₆ = 46, Ω₄₇ = 47, Ω₄₈ = 48, Ω₄₉ = 49, Ω₅₀ = 50, Ω₅₁ = 51, Ω₅₂ = 52, Ω₅₃ = 53, Ω₅₄ = 54, Ω₅₅ = 55, Ω₅₆ = 56, Ω₅₇ = 57, Ω₅₈ = 58, Ω₅₉ = 59, Ω₆₀ = 60, Ω₆₁ = 61, Ω₆₂ = 62, Ω₆₃ = 63, Ω₆₄ = 64, Ω₆₅ = 65, Ω₆₆ = 66, Ω₆₇ = 67, Ω₆₈ = 68, Ω₆₉ = 69, Ω₇₀ = 70, Ω₇₁ = 71, Ω₇₂ = 72, Ω₇₃ = 73, Ω₇₄ = 74, Ω₇₅ = 75, Ω₇₆ = 76, Ω₇₇ = 77, Ω₇₈ = 78, Ω₇₉ = 79, Ω₈₀ = 80, Ω₈₁ = 81, Ω₈₂ = 82, Ω₈₃ = 83, Ω₈₄ = 84, Ω₈₅ = 85, Ω₈₆ = 86, Ω₈₇ = 87, Ω₈₈ = 88, Ω₈₉ = 89, Ω₉₀ = 90, Ω₉₁ = 91, Ω₉₂ = 92, Ω₉₃ = 93, Ω₉₄ = 94, Ω₉₅ = 95, Ω₉₆ = 96, Ω₉₇ = 97, Ω₉₈ = 98, Ω₉₉ = 99, Ω₁₀₀ = 100, Ω₁₀₁ = 101, Ω₁₀₂ = 102, Ω₁₀₃ = 103, Ω₁₀₄ = 104, Ω₁₀₅ = 105, Ω₁₀₆ = 106, Ω₁₀₇ = 107, Ω₁₀₈ = 108, Ω₁₀₉ = 109, Ω₁₁₀ = 110, Ω₁₁₁ = 111, Ω₁₁₂ = 112, Ω₁₁₃ = 113, Ω₁₁₄ = 114, Ω₁₁₅ = 115, Ω₁₁₆ = 116, Ω₁₁₇ = 117, Ω₁₁₈ = 118, Ω₁₁₉ = 119, Ω₁₂₀ = 120, Ω₁₂₁ = 121, Ω₁₂₂ = 122, Ω₁₂₃ = 123, Ω₁₂₄ = 124, Ω₁₂₅ = 125, Ω₁₂₆ = 126, Ω₁₂₇ = 127, Ω₁₂₈ = 128, Ω₁₂₉ = 129, Ω₁₃₀ = 130, Ω₁₃₁ = 131, Ω₁₃₂ = 132, Ω₁₃₃ = 133, Ω₁₃₄ = 134, Ω₁₃₅ = 135, Ω₁₃₆ = 136, Ω₁₃₇ = 137, Ω₁₃₈ = 138, Ω₁₃₉ = 139, Ω₁₄₀ = 140, Ω₁₄₁ = 141, Ω₁₄₂ = 142, Ω₁₄₃ = 143, Ω₁₄₄ = 144, Ω₁₄₅ = 145, Ω₁₄₆ = 146, Ω₁₄₇ = 147, Ω₁₄₈ = 148, Ω₁₄₉ = 149, Ω₁₅₀ = 150, Ω₁₅₁ = 151, Ω₁₅₂ = 152, Ω₁₅₃ = 153, Ω₁₅₄ = 154, Ω₁₅₅ = 155, Ω₁₅₆ = 156, Ω₁₅₇ = 157, Ω₁₅₈ = 158, Ω₁₅₉ = 159, Ω₁₆₀ = 160, Ω₁₆₁ = 161, Ω₁₆₂ = 162, Ω₁₆₃ = 163, Ω₁₆₄ = 164, Ω₁₆₅ = 165, Ω₁₆₆ = 166, Ω₁₆₇ = 167, Ω₁₆₈ = 168, Ω₁₆₉ = 169, Ω₁₇₀ = 170, Ω₁₇₁ = 171, Ω₁₇₂ = 172, Ω₁₇₃ = 173, Ω₁₇₄ = 174, Ω₁₇₅ = 175, Ω₁₇₆ = 176, Ω₁₇₇ = 177, Ω₁₇₈ = 178, Ω₁₇₉ = 179, Ω₁₈₀ = 180, Ω₁₈₁ = 181, Ω₁₈₂ = 182, Ω₁₈₃ = 183, Ω₁₈₄ = 184, Ω₁₈₅ = 185, Ω₁₈₆ = 186, Ω₁₈₇ = 187, Ω₁₈₈ = 188, Ω₁₈₉ = 189, Ω₁₉₀ = 190, Ω₁₉₁ = 191, Ω₁₉₂ = 192, Ω₁₉₃ = 193, Ω₁₉₄ = 194, Ω₁₉₅ = 195, Ω₁₉₆ = 196, Ω₁₉₇ = 197, Ω₁₉₈ = 198, Ω₁₉₉ = 199, Ω₂₀₀ = 200, Ω₂₀₁ = 201, Ω₂₀₂ = 202, Ω₂₀₃ = 203, Ω₂₀₄ = 204, Ω₂₀₅ = 205, Ω₂₀₆ = 206, Ω₂₀₇ = 207, Ω₂₀₈ = 208, Ω₂₀₉ = 209, Ω₂₁₀ = 210, Ω₂₁₁ = 211, Ω₂₁₂ = 212, Ω₂₁₃ = 213, Ω₂₁₄ = 214, Ω₂₁₅ = 215, Ω₂₁₆ = 216, Ω₂₁₇ = 217, Ω₂₁₈ = 218, Ω₂₁₉ = 219, Ω₂₂₀ = 220, Ω₂₂₁ = 221, Ω₂₂₂ = 222, Ω₂₂₃ = 223, Ω₂₂₄ = 224, Ω₂₂₅ = 225, Ω₂₂₆ = 226, Ω₂₂₇ = 227, Ω₂₂₈ = 228, Ω₂₂₉ = 229, Ω₂₃₀ = 230, Ω₂₃₁ = 231, Ω₂₃₂ = 232, Ω₂₃₃ = 233, Ω₂₃₄ = 234, Ω₂₃₅ = 235, Ω₂₃₆ = 236, Ω₂₃₇ = 237, Ω₂₃₈ = 238, Ω₂₃₉ = 239, Ω₂₄₀ = 240, Ω₂₄₁ = 241, Ω₂₄₂ = 242, Ω₂₄₃ = 243, Ω₂₄₄ = 244, Ω₂₄₅ = 245, Ω₂₄₆ = 246, Ω₂₄₇ = 247, Ω₂₄₈ = 248, Ω₂₄₉ = 249, Ω₂₅₀ = 250, Ω₂₅₁ = 251, Ω₂₅₂ = 252, Ω₂₅₃ = 253, Ω₂₅₄ = 254, Ω₂₅₅ = 255, Ω₂₅₆ = 256, Ω₂₅₇ = 257, Ω₂₅₈ = 258, Ω₂₅₉ = 259, Ω₂₆₀ = 260, Ω₂₆₁ = 261, Ω₂₆₂ = 262, Ω₂₆₃ = 263, Ω₂₆₄ = 264, Ω₂₆₅ = 265, Ω₂₆₆ = 266, Ω₂₆₇ = 267, Ω₂₆₈ = 268, Ω₂₆₉ = 269, Ω₂₇

[illegible]

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11

[illegible]

$\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = \frac{d}{dt} \left(\frac{1}{2} m \dot{x}^2 + \frac{1}{2} m \dot{y}^2 + \frac{1}{2} m \dot{z}^2 \right)$

SAMPLE CALCULATIONS

Diameter of the average contact area for Tape 6

The statistical analysis of the data for Tape 6 is given in Table XX.

N = number of contacts in one interval

σ = the square root of the average of the squares of the two extreme tape distances for one interval

$\bar{\sigma}$ = the square root of the average of the squares of all the tape distances

$$\bar{\sigma}^2 = \sum (\sigma^2) / \sum N$$

$$\bar{\sigma} = \sqrt{\sum [N(\sigma/2)^2] / \sum N} = \sqrt{16238/353} = 6.80\text{mm}$$

d_A = diameter of the average contact area

$$d_A = \frac{\bar{\sigma} \times (\text{crossing speed})}{2 \times (\text{tape speed})} = \frac{6.80(.0067)}{100} = 5.90 \times 10^{-4}\text{cm}$$

THEORY

Let X_1, X_2, \dots, X_n be a random sample of size n from a normal distribution with mean μ and variance σ^2 .

The sample mean \bar{X} and sample variance S^2 are defined as follows:

$$\bar{X} = \frac{1}{n} \sum_{i=1}^n X_i$$

$$S^2 = \frac{1}{n-1} \sum_{i=1}^n (X_i - \bar{X})^2$$

It is known that \bar{X} and S^2 are independent random variables.

The distribution of \bar{X} is normal with mean μ and variance $\frac{\sigma^2}{n}$.

The distribution of S^2 is chi-square with $n-1$ degrees of freedom.

$$S^2 \sim \frac{\sigma^2}{n-1} \chi_{n-1}^2$$

$$\sum_{i=1}^n (X_i - \bar{X})^2 = (n-1)S^2$$

$$\bar{X} = \frac{1}{n} \sum_{i=1}^n X_i = \frac{1}{n} \left[\sum_{i=1}^n (X_i - \bar{X}) + n\bar{X} \right] = \bar{X}$$

Thus, \bar{X} and S^2 are independent random variables.

$$\bar{X} \sim N\left(\mu, \frac{\sigma^2}{n}\right) \quad \text{and} \quad S^2 \sim \frac{\sigma^2}{n-1} \chi_{n-1}^2$$

APPENDIX C

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Size of individual
contacts in sliding
friction.

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